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PHOTOGRAPHER'S NOTE-BOOK.

1. ART—WHAT IS IT? A SYMPOSIUM.

Ars est celare artem. It is the perfection of art to conceal art.—OVID.

Ars longa, vita brevis. Art is long, life is short.—HIPPOCRATES.

Art is long and time is fleeting.—LONGFELLOW.

Art does not represent things falsely, but truly as they appear to mankind.—RUSKIN.

Art is a jealous mistress.—EMERSON.

Art is not the bread indeed, but it is the wine of life.—JEAN PAUL.

Art is the work of man under the guidance and inspiration of a mightier power.—HARE.

Art must anchor in nature, or it is the sport of every breath of folly.—HAZLITT.

Art rests on a kind of religious sense, on a deep steadfast earnestness; and on this account it unites so readily with religion.—GOETHE.

Artists are of three classes: those who perceive and pursue the good, and leave the evil; those who perceive and pursue the good and evil together, the whole thing as it verily is; and those who perceive and pursue the evil, and leave the good.—RUSKIN.

Art *is* art precisely because it is *not* nature.—GOETHE.

The art of a thing is, first, its aim, and, next, its manner of accomplishment.

Nature is not at variance with art, nor art with nature; they being both the servants of God's providence. Art is the perfection of nature. In brief, all things are artificial; for nature is the art of God.—SIR T. BROWN.

The conscious utterance of thought by speech or action to any end is art.—EMERSON.

> To gild refinèd gold, to paint the lily,
> To throw a perfume on the violet,
> To smooth the ice, or add another hue
> Unto the rainbow . . . .
> Is wasteful, and ridiculous excess.
>
> —SHAKESPEARE, "King John," iv. 2.

Painting is the intermediate something between a thought and a thing.—S. T. COLERIDGE.

Thought is the unseen nature, as nature is the unseen thought.—HEINE.

Nature must be the groundwork of wit and art.—JOHN SELDEN.

Painting does not proceed so much by intelligence as by sight and feeling and invention.—HAMERTON.

Painting is silent poetry, and poetry speaking is painting.—SIMONIDES.

A picture is a poem without words.—HORACE.

A work of art should offend neither the intellect nor the senses.

A work of art improves upon acquaintance.

2. ART—VARIOUS WAYS OF REGARDING IT.

As an elegant amusement.
As an ingenious trick or craft.
As a form of commercial enterprise.
As an emotional stimulus or intoxicant.
As enforcing religion.
As advancing morality.

3. ART, OBJECT OF PICTORIAL.—One of the differences between good and bad art is shown by the way in which it at first glance strikes an educated eye. The cultivated artist does not seek to deceive, but to impress ; the trickster thinks imitation is the end of his business. True art does not aim at representing reality, but the appearance of reality.

4. ART: WHAT IT TEACHES.—Upon this point opinions vary. It is therefore well to hear all sides. Dean Farrar, who has made a special study of the subject, says that in all great art there is a spiritual as well as a technical side, that a work of art of any value expresses something of the individual—*i.e.*, artist. It is the expression of that person's delights and enjoyments. Hence art is a powerful education factor. It teaches us not only to see and what to see, but also to look beyond and behind the externals of things.

It will interest many photographers to know that the romantic love of scenery is comparatively unknown in ancient literature, if we except the Psalms, Song of Solomon, and some other portions of the Bible.

Moreover, that comparatively few modern poets have become conspicuous as "word painters."

The beauty that appeals to the artist is best described in Spenser's lines :—

> Beauty is not as some men misdeem,
> An outward show of things that only seem.

5. ART, IMITATION NOT THE END OF.—We are frequently told by our scientific friends that imitation is the end of art. That if we could retain the image as seen on the ground glass, we should of necessity have a work of art. Ruskin deals at length with this assumed position, and shows that it is not the case—so far as painting goes.

(*a*) It is only possible with trivial subjects or parts—*e.g.*, one may closely imitate a leaf, but not a tree.

(*b*) It is elementary, easy, and does not require the real difficulties of art.

(*c*) It presents crude matter only, while true art deals with qualities, thoughts, emotions, conceptions.

(*d*) It appeals to the senses only, *i.e.*, the perceptive (optic) faculty. True art speaks to the intellect, the imaginative or conceptive faculty.

(*e*) It gives general resemblances such as appeal to the least informed.

(*f*) It is limited in range of subject, and limits one to the illusive representation of still life and simple figures, and practically excludes landscape, historical, and imaginative work.

(*g*) It may be reduced to empirical rules and become a mere mechanical operation.

ART, IMITATION NOT THE END OF—*continued.*

(*h*) It appeals to the less informed spectators, *i.e.*, those least qualified by training and culture of intellect, taste, and perception to have sound opinions.

(*i*) It relies upon the least valuable or average characteristics, rather than those of ideal or exalted phases of energy or beauty.

(*j*) It has not at its command the full power of light and dark, or range of colour of nature, and, therefore, it is impossible to exactly match many tones and tints. Nor can it on a flat surface give the effect of binocular vision. Nor can it literally present moving objects or varying aspects.

(*k*) In proportion to the degree of knowledge of the spectator does deceptive presentation increase in difficulty. Thus it relies upon some ignorance in the spectator.

6. ART NOT EXECUTION OR IMITATION.—A poet would think that a poor compliment had been paid him if his critic, by way of exalting him, were to point out that he had evidently taken great pains and was very honest. In like manner, either a composer or an executant of a piece of music would be ill-satisfied if no higher praise were awarded than honesty or painstaking. If painting is a Fine Art because it resembles poetry, the presumption is that a similar test should be applied. The presumption is, that the critic who points out that this or that object is not faithfully imitated is dealing with a point of minor importance which cannot decide the artistic value of the work.—PARKER.

7. ARTS OF REPRESENTATION.—Statuary and poetry are also arts of representation ; but the former of these attracts comparatively little attention at the present day, while the latter, as a part of literature and the common property of all educated men, stands apart. The non-representant arts are music and architecture.—PARKER.

But, fundamentally, architecture is a useful art in the strict sense of the term, differing in this respect from its sister arts.—PARKER.

8. ARTISTIC PERCEPTION, FOUR STAGES OF.—Mr. Ruskin has pointed out that these four stages are somewhat thus : First, and lowest, that represented by Peter Bell, who only sees or cares to see the common-place aspects of natural objects :—

> A primrose by a river's brim
> A yellow primrose was to him,
> And it was nothing more.
>
> The soft blue sky did never melt
> Into his heart ; he never felt
> The witchery of the soft blue sky.

The second condition is that of a sentimental character. This may pass on the one hand into the grotesque, or on the other hand may swing to the opposite extreme, the morbid or falsely pathetic.

A third phase is characterised by an approximate balance of reason and emotion, taste and judgment, fact and fancy, together with an active imagination, duly under control and power of generalising, so that the class is recognised in the type.

ARTISTIC PERCEPTION, FOUR STAGES OF—*continued.*

Another, a fourth stage or phase, is that when inspiration seeks expression, when human powers are rendered subservient to the mystery of nature.

These stages are not of necessity thus in natural order, but are rather as kindred branches of a great tree. The moral life is not an essential part of the expression of imagination or inspiration. The errors or shortcomings in the lives of Shakespeare or Turner do not invalidate the value of their work.—FOUNDED ON RUSKIN.

9. FINE ART.—Fine art comes of the union of love and labour, for without love it has no sufficient motive, and without labour it can have no success. As all ideas cannot be put in words, art in some form or other is a human necessity.—GAMBIER PARRY.

10. HIGH ART.—Ruskin with much truth points out that *high* art differs from *low* art in that the former possesses an excess of beauty in addition to its portrayal of truth, but not in possessing any excess of beauty inconsistent with truth.

11. REAL, i.e. GOOD ART, TWO THINGS IN.—*First*, every work of art expresses some personal choice, selection, preference, *i.e.*, reflects personality. "I take this, I pass by that." The fisherman's net gathers all, but the artist's only takes the pearls. *Second*, in every work of art there is the expression of human arrangement, *i.e.*, of design. Not only is it a record of facts observed, but it is a selection of the way those facts are to be set forth. Personality is thus twofold, an expression of choice and of design.

12. ART, TRUTH IN.—Harding says that "truth, whether in science or art, must ever be the standard to which all opinions and judgments must ultimately be referred; no one endowed with reason will venture to deny or to reject laws perfect and demonstrable, nor be unwilling to acknowledge their immense superiority over unfounded speculations and conventionalities."

13. ART AND NATURE.—Art is based upon fact, *i.e.*, upon nature, but is not the same as nature, any more than the man who holds up the mirror to nature is an artist. Goethe truly says art is art precisely because it is not nature. Hence it follows that art must tell the truth, but this is not equivalent to saying that it must tell every truth.

14. ART AND MANUFACTURE.—Manufacture is literally "hand-made" work. Art requires, in addition to hand-work or manipulation, the guiding of the mind, the impulse of the soul. To read a work of art—be it poem or picture—is to read the thoughts of its maker. Just as when we see a cobweb we know a spider has wrought it. Great art is thus the product of a great mind.

15. ART, METHODS OF—FRESCO, SECCO, TEMPERA.—All these terms are used to denote various methods of applying colours to walls for pictorial or decorative purposes.

ART, METHODS OF—FRESCO, SECCO, TEMPERA—*continued.*

Fresco (lit. *fresh*).—A painting on a fresh (*i.e.*, wet) ground of lime or gypsum. The colours combine with the lime, and are greatly subdued in strength. Hence to retouch the work is extremely difficult, if not quite impossible. Good modern examples may be seen in the South Kensington Museum on a wall in one of the statuary rooms. These are by the late Sir F. Leighton, and represent "Peace and War."

Secco (*Sicco*—lit. *dry*).—A very similar process, with this chief difference, that the colours are applied to the plaster when it is dry.

Tempera (lit. *to mingle*).—A similar process again, whereby the colours are combined with egg, glue, size, gum, etc.

16. DECORATIVE ART, ORIGIN OF.—The origin of decorative art is to be found in the imitation of nature, and it is probable that all ornaments, no matter how conventionalised, could, with adequate knowledge, be traced by a series of minute modifications to some natural object.—JOHN COLLIER.

It has been thought that most architectural designs and contrivances are from suggestions on the part of nature, *e.g.*, the elaboration of the Egyptian capital from the crown of a palm tree, the arches of Gothic architecture from the meeting of tree branches in a grove. Many decorative moulding ornaments are clearly imitations of natural forms, *e.g.*, rose, shell, leaf, grape, etc., etc.—N. C.

17. PHOTOGRAPHY, THREE COMMON DEFECTS IN PICTORIAL.—(1) False tonality, *i.e.*, not rendering truly the relative light and shade values of variously coloured objects.

(2) Superabundance of detail or of subject.

(3) Lack of breadth and quietness, due to spottiness, scattering of lights and shades.

18. PHOTOGRAPHY AN ART-SCIENCE.—Some have thought the term "art-science" a contradiction. This, however, is not so in the case of photography. Art tells the photographer what he wants to do, and science enables him to do it. Or we may use other terms, and say, "Taste directs his judgment, and craft (or handicraft) accomplishes what his judgment directs."

19. PHOTOGRAPHY, USE OF, TO THE ARTIST.—It is interesting to note what the well-known authority on landscape painting, viz., Barnard, has to say about this subject, *e.g.*, "The great use of photography to the artist is to supply accurate copies of portions of nature, or faithful transcripts of the effects which he has in the first instance studied from nature; in this way it may be made to assist him by securing for his use the more correct representation of form and light and shade; while it is indebted to him for the more enlarged arrangement of lights and shades known by the comprehensive appellation of *chiaroscuro*."

This quotation is of especial value; firstly, because it was written before the question of art *v.* photography had received very much attention on either side, and, secondly, it puts the matter in a generous light, *i.e.*, as being partners, mutually helpful, rather than rivals or competitors.

20. PHOTOGRAPHY, VALUE OF, TO PAINTERS.—Photography has done great things for the study of instantaneous action, especially that of clouds and waves, and much knowledge of form may be acquired by its means. . . .

Photography ought to be of the greatest service to all learners of landscape. It supplies them with any quantity of beautiful foreground material. It gives them forms of Alpine roses beyond the reach of schoolboys, its ferns cannot be collected by fancies, nor can donkeys browse upon its weeds. And more than this, photography enables young artists to study rocks coolly—not an easy thing to do in a general way. What is best of all, photographs of well-known views can always be had, and any student may compare his own work, in lines and coloured sketch, with all the true form of his subject.

No practice can be of more certain value than that of working out a subject, already drawn from its photograph, first in light and shade, then in colour, at home and with every advantage and assistance.—J. St. J. Tyrwhitt.

21. PHOTOGRAPHER, WHAT SCULPTURE TEACHES THE.—A study of the best sculpture, and especially statuary of the best period, gives point to that one thing which photographic portraiture and figure presentation chiefly lack, viz., importance, grandeur, dignity. A photograph of a living person alongside a photograph of a figure by, say, Praxiteles, shows at once how trivial the former is, how it lacks grace, simplicity of line and arrangement, largeness and quietness of treatment. It is a most valuable object lesson to try and pose and drape a living head and bust in exact imitation of any good Greek work of the best time, and then compare the two point by point. This study will emphasise the supreme importance of simplicity of arrangement of line, of lighting, omission of accessories, the importance of dealing with a well-marked rather than a transitory expression. This will also show that character in portraiture is not due to some one feature, but to the whole bust, largely treated, and that its pose and balance are fully as important as the features.—N. C.

22. THE ARTIST AND NATURE.—Symonds has with much truth worked out the proposition that the landscape painter stands much in the same position with regard to nature that the sculptor does to the nude.

23. ARTIST, HOW HE LOOKS AT NATURE.—He does not look at nature with the material, bodily eye only, but looks as it were through the eye, as through a window, and sees what the eye sees not, any more than does the insensitive transparent window pane. Remotely, it may be compared to hearing, not only as a spoken word, but hearing the thought of which the word is but the sound symbol.

24. APPRECIATION IN PARTS DEPENDS ON OUR MOOD.—It lies within the experience of us all that our likes are liable to vary with age and circumstances. Thus we may be powerfully impressed with a work of art at one time, and the same work may entirely fail to interest

us a short time later, and *vice versâ*. A modern writer has pointed out that the true artist is chiefly concerned with the appearance of things rather than with their actual constitution or nature; and that he selects such an aspect or impression as accords with his general condition at the time. Hence a painter may and often does give two entirely different "impressions" of the same view, and both may be equally good and truthful.

25. CRITICISM—A QUOTATION.—The word "criticism" is often used where the term "fault-finding" would be more appropriate. Mr. S. A. Brooke, in his preface to an edition of Turner's "Liber Studiorum," says:—"There is one kind of criticism which is altogether vile; it is that which strives to find out mistakes for the sake of pluming itself on its own cleverness; and rather than fall into that it is better not to get into the habit of blame at all."

26. SIGHT.—All sight is, in fact, an act of judgment. The brain receives messages from each retinal element, and from these messages it constructs a mental picture of the actual scene, much in the same way that a general, whilst a battle is going on, receives messages from all sides, and from these messages forms his idea of what is happening on the field of action. So far does the analogy hold, that the mind supplies from its own knowledge a great part of the mental picture, the actual messages from the retina being quite insufficient to give a complete perception of the scene without.—JOHN COLLIER.

27. SEEING WITH THE EYE AND THE MIND.—Harding with much truth points out that "as the eye finds less to attract and engage its attention in the means themselves . . . so the mind receives more vivid impressions." In this short quotation is contained much valuable information—and warning. For instance, to use a surface texture of paper not too rough, nor attractively shiny. No excess of microscopic definition or irritating bewildering blur. A mount of quiet colour and pleasant proportions, avoiding any maze-like arrangement of lines; a frame of simple pattern of quiet colour, not excessive in size, either in slenderness or heaviness. A vivid impression of sunset is not best conveyed by stormy clouds in angry red carbon or a snow scene in crude blue. The impression which most "impresses" is that conveyed by suggestion rather than by imitation.

28. PROPER VISUAL SIZE OF THE SUN OR MOON.—The proper size of the sun or moon in a perspective drawing should be three-eighths of an inch if the picture is intended to be seen at a distance of three feet, and smaller or larger as the picture is to be seen nearer or farther off than that distance. In other words, its diameter should always subtend an angle of about half a degree with the eye. Though this is the correct size it will always *appear* too small. The sun's glory cannot be given in such a narrow compass. We must, therefore, enlarge it a little to satisfy the cravings of the eye, but not much, as it would then look absurd to the educated.—TRISTRAM J. ELLIS.

PROPER VISUAL SIZE OF THE SUN OR MOON—*continued.*

A photograph of the moon taken with an ordinary long-focus landscape lens always is surprisingly small when the first experiment is made. Three-eighths of an inch at 36 inches is equivalent to a three-penny piece at 63 inches or, say, 5 feet.—N. C.

29. PRIMARY COLOURS (PAINTER AND OPTICIAN).—The so-called primary colours (*i.e.*, pigments) of the painter's palette are not to be confused or confounded with the primary colours of the optician. The painter regards red, yellow, and blue as his primary colours. These combined in pairs yield the secondary colours. Thus red and yellow give orange. Yellow and blue yield green. Red and blue give violet. These secondaries combined yield the tertiary colours, olive, russet, etc. A mixture of red, yellow, and blue yields greys of various tints according to circumstances. The optician, however, regards red, green, and violet as the primary colours. By combining light of these colours any other colour may be produced. Hence, in the three-colour process of photographic picture reproduction the photographer uses the optician's primaries, viz., red, green, and violet, for his colour screens or filters, and the painter's primaries, viz., blue, red, and yellow, for his printing inks.

30. THE EMOTIONS AND THE INTELLECT.—In Professor Waldstein's book on the subject there are many hints for the artist, be he photographer, painter, or sculptor. (The learned doctor has made a world-wide reputation as an authority upon early Greek sculpture.) He points out that good art appeals to both the intellect and the emotions. That the emotions are the moving power and the intellect is the guiding power of the mind. That sensation is at the root of all emotion. Hence it follows that a picture of high order requires a well-trained mind as well as refined emotions for its due appreciation. A person who is only cultivated on one side, be it the emotional *or* intellectual, is as a lop-sided tree or a one-handed man—imperfect, abnormal. Similarly a map or plan or topographical photograph only appeals to the intellect; a patch or group of colours or of lines, curves, as in much (so-called) decorative work, only speaks to the emotions.

31. IMPORTANCE OF IMPRESSIONS.—It is only what strongly impresses us that we vividly remember. It is only what we remember best that we love most. It is only what we love most that we can do best. So our best work must always be the offspring of our keenest impressions. Hence the great importance of educating the power of selecting from our impressions those that are worth attention and retention.

32. ANALYSIS OF IMPRESSIONS.—When any picture or scene strikes one it is an excellent plan to put down *at once*, no matter how roughly, on any scrap of paper, the salient points of the impression, in the order of their memory importance. In this way the power of pictorial analysis and selection is greatly cultivated, and also adds to the enjoyment of any great work of art.

33. IMPRESSIONISTS.—On this topic Armitage says:—"We have heard a good deal lately of a new school of painters calling themselves impressionists. I need hardly say that I have but little sympathy with their work. To neglect form, as they ostentatiously do, is to abandon voluntarily the highest quality of art." In a painting of the first rank we look to have truthfulness of form, light and shade (values), and of colour. If any one of the three be neglected or over-emphasised, the *unity* of effect is reduced, and the work fails in the completeness essential to the greatest work.

34. ART AND IMAGINATION.—What I mean by an art is some creation of man which appeals to his emotions and his intellect by means of his senses. All the greater arts appeal directly to that intricate combination of intuitive perceptions, feelings, experience, and memory which is called imagination.—Wm. Morris.

One reason why we so soon tire of any particular photograph is that it generally appeals more to the intellect than to the emotions. We are more impressed by the difficulties overcome or the craft displayed than by the suggestion of anything not definitely expressed. There is nothing left for the imagination to work upon.—N. C.

35. THE IMAGINATION IN ART, APPEAL TO.—The appeal to the imagination, Mr. Ruskin rightly points out, is by means of three factors. First, the mind is supplied with facts; secondly, these facts are selected, arranged, combined, so that they shall tell as real facts do; thirdly, the effect is heightened by due attention to characteristics of form, colour, and so on. Thus it is shown that in the "pursuit of fact is the vital element of art power," or, in other words, art is based upon nature.

36. IMAGINATION A SOURCE OF INTEREST.—A picture that appeals to the imagination continues to interest the spectator much longer than one which only appeals to memory or the intellect. As soon as the intellect has found approximate satisfaction or approval, or the memory has been vividly stimulated, the interest thenceforward begins to flag. But a picture which appeals to the imagination grows in interest as the imaginative powers are more and more called upon. Hamerton points out that the *un*imaginative painter is never widely popular. This is manifestly the case, and the reason, perhaps, is that a picture appealing to the intellect can only find response in certain attuned minds, while one that appeals to the imagination scarcely ever fails to find some response, although, perhaps, no two people see it quite alike. Moral: always have in your photograph some part where the imagination may find exercise.

37. IMAGINATION AND HALLUCINATION.—It is only in comparatively recent times that artists of all kinds are becoming fully alive to the importance of *educating* the imagination. It is still a popular delusion with the majority (not excluding some photographers) that all products of the imagination are of equal value; that the critical faculty

applied to the imagination is harmful; and that the imagination feeds upon itself and should not be under rule, control, or discipline. It is therefore as well to quote the able authority Hamerton, who points out that imagination sees images with the mind's eye, but when these images are as though seen by the physical eye they are hallucinations, and may not be distinguished from reality. When this is the case, mania, insanity, or madness is the general result. Hence the deep truth in the common saying that it is only a narrow line that separates genius from insanity.

38. LIGHT AND SHADE, NATURE OF.—There is nothing more rare in ordinary procedure than that beautiful and thoroughly artistic treatment of nature in which she is apprehended as light and shade and colour only, the form being nowhere insisted on, though nowhere inaccurately rendered.—G. BALDWIN BROWN.

39. LIGHT, SHADE, AND SHADOW.—There is usually a well-marked relationship between the lights, shades, and shadows of a scene. The shades are darker than the lights, and the shadows are darker than the shades. It is not so much a question of darkness, but of quantity of light. In the darkest cast shadows in nature there is always some light, although by contrast at times the cast shadow may seem absolute blackness and utterly devoid of any light.

40. SHADE IS NOT TO BE CONFUSED WITH SHADOW.—For instance, the light may fall upon one side of a cottage, while its adjacent side receives no direct light, *i.e.*, it is *in shade.* Shade is a negative quality, the light is simply withheld from that part; shade is then an absence of light. At the same time the whole cottage may *cast a shadow* of its form on the ground or adjacent wall, etc.

41. NATURE'S LIGHTS AND DARKS.—Nature is economical. She puts her lights and darks only where she needs them. Don't try to be more skilful than she is.—HUNT.

42. LIGHT AND SHADE.—In nature we can put our hands *into* the shades, but we put them *upon* the lights.

Nature puts on the lights, and leaves the shades, whereas with crayon or pencil we put on the shades and leave the lights (*i.e.*, the white paper).

Without shade the white paper is not light, wanting the contrast of shade which alone can make it appear luminous and attractive.

One dark and one light place in every picture.—HUNT.

43. SHADE INDICATES RELIEF.—Light falling upon a flat surface, a sheet of paper, for instance, illuminates it equally at all points. If the paper be bent or creased, some parts are more towards, and others more away from the light; the former are lighter, and the latter darker. Thus we know that all the parts are not in one plane.

44. VARIATIONS OF SHADE DETACH ONE PART OF A PICTURE FROM ANOTHER.—By these variations and contrastings of shades we are able to have different planes in our picture, *e.g.*, the foreground, middle, and extreme distances, with countless intermediates connecting them. For instance, a cottage in the foreground, clump of trees in the middle, and hills in distance, with sky beyond. The sunlight side and shaded side of the cottage give local relief. The former is lighter than, and the other darker than, the belt of trees behind the cottage, and thus it comes away from the middle distance. Similarly the trees are detached from the hills beyond, and they in turn are in front of the sky and clouds.

45. SHADE REVEALS FORM.—We cannot do more than guess at form as indicated by outline only. For instance, we may draw two parallel lines to indicate the form of a cylinder, but by means of shade only can we show the concave or convex—the inside or outside—of it. An egg-shaped outline may represent the end of a teaspoon, but by shading it we can indicate either the concave or convex side at will. An elliptical outline only may represent something of that form, or it may represent a circle seen in perspective. By properly shading this outline it may be made to represent an egg-like body.

46. EVERYTHING THAT HAS FORM (i.e., is not flat) HAS LIGHT AND SHADE.—Since the different parts of the object are inclined at different angles to the direction of light, they reflect different degrees of brightness.

47. SHADOWS ARE NOT TO BE CONFUSED WITH REFLECTIONS.—It is not an uncommon thing to hear people talking of the shadows of the trees, boats, etc., in the water.

(1) Reflections are only formed by smooth surfaces—water (clean), metals, wet sand, etc. The smoother the surface the less light it scatters, and the better it reflects. We may compare the reflecting powers of a sheet of metal, one part more polished than another—or of clean water, and water with a film of dust floating on it. Thus the conditions favourable to the formation of reflections are unfavourable to the receiving of shadows ; the two are seldom seen together, but they do co-exist at times.

(2) Reflections give an inverted picture of the object.

(3) The position of the reflected image shifts with any movement of the spectator, or with the movement of the reflecting surface, *e.g.*, waves, etc. A cast shadow retains its position independent of the position of the spectator.

(4) Reflections are formed in any light, direct or diffused. Shadows are cast varying in strength and sharpness of outline in proportion with the strength and directness of the illumination.

(5) Reflections are independent of the direction of light. Shadows are entirely dependent upon the direction of illumination.

(6) Reflections are virtual. Shadows are real, *i.e.*, we can receive a shadow on a piece of paper ; several people can see the same shadow at the same time, it is a real existence. Reflections cannot be seen

except by placing the eye in a certain position; no two people can see the same reflected image at the same time, as it varies with the position of the spectator.

48. CAST SHADOWS—SOME IMPORTANT CHARACTERISTICS OF.—(For the difference between shade and shadow refer to p. 10.)

Shadows show gradation, and are darkest nearest to the object casting the shadow.

Shadows are of a negative character, *i.e.*, they are due to light being intercepted or cut off from falling on a certain place.

Shadows are often lighted by reflected light, *i.e.*, light reflected or thrown into the shaded portion by some adjacent light-reflecting body, whitewashed wall, etc., etc.

Shadows vary in apparent strength according to their distance from the spectator. They are stronger, darker as they are nearer the eye, *i.e.*, the contrast of light and shadow is strongest in the foreground.

Form of shadow depends upon the form of the object casting the shadow, the direction of the incident light, and the nature of the surface upon which the shadow falls. For instance, a straight stick may cast a curved shadow if falling upon a curved surface, *e.g.*, the outside of a barrel, or it may take the form of a broken zig-zag line perhaps if falling on some steps. Thus the form of a shadow often indicates the form of the surface upon which it falls.

Shadow is darker than shade if the body casting the shadow and the surface receiving this cast shadow are of the same value or tone.

Shadows increase in sharpness of outline as the light is stronger. A clear day is accompanied by sharper shadows than a day with haze or fog in the air.

Shadows vary in apparent intensity with the brightness of the light. It is not, however, that the shadows are blacker so much as they appear blacker by reason of being contrasted with a stronger surrounding light. In fact, it may happen that the cast shadow in a bright sun is lighter than that of a dull day by reason of in the first case receiving more reflected light; but the contrasts are accentuated, and hence it appears darker.

49. OUTLINES.—It is true that there are (in nature) no outlines, but everything has a boundary—and these boundaries have a definite shape. Every object in nature divides space into two parts, the space where it is, and the space where it is not; between these two portions of space there is a boundary, which is not space itself, for it takes up no room, but it has form for all that.—JOHN COLLIER.

In a drawing the outline is to the *contour* of a real figure or body just what the light and shade are to its *surface*; the one leaves an object superficial, the other makes it appear solid.

The moment light and shade are introduced, the outline should cease to exist as an outline—it is no longer required.

Nature takes so much pains to conceal a distinct outline.—J. D. HARDING.

50. DETAIL IN ART AND NATURE.—Too much minute imitation in a sketch or picture is often more detrimental to its merits than too little. The artistic portraiture of an object results, in fact, entirely from the mere representation of those peculiarities only of the object which most forcibly and immediately strike the eye. . . . It is because photographic portraits exhibit an excessive representation of minute characteristics that they so frequently fail to produce an impression of a perfect likeness, notwithstanding they give the outline of the face perfectly, whilst it is certain that photographs portray the foliage of a tree with so much *minutiæ* that the result is often that of an uninstructive blotch. Hence it is not easy to discern which is the representation of oak, elm, and other kinds of foliage in a photograph; nor can a drawing indicate the characteristic aspect of foliage unless it has been made with discrimination and judgment so as to display the portrayal of striking general characteristics rather than of barely obvious peculiarities.—WALTER CRAYON, "Rules for Sketching," etc.

51. DETAIL, LIMIT OF.—All that can be effected with buildings, or indeed any other objects, is to convey distinctly an idea of nature. In a building, whether it be old or new, whether the stones composing it be regular or irregular in shape, when sufficient is portrayed to show this, enough has been done; the likeness is not improved by exhibiting the portraiture of every stone, since the spectator only recognises that which is above alluded to in connection with the form; the number of stones contained in it being as little known to him as to the painter, the exact representation of all is not felt essential to a satisfactory resemblance.

Persons who are unacquainted with art admire the works of Hobbema because they are painted on a level with their capacities; but the works of Titian, from being of a higher order, require that the spectator should be cultivated before he can perceive the fulness of their merits and justly appreciate the talent of the artist.—J. D. HARDING.

As a general rule it is better to give too little of the character of an object in the shade than too much.—J. D. HARDING.

52. DETAIL OR FOCUS: A PRACTICAL NOTE.—It is advisable to soften the markings of detail in any distant object when a nearer one is required to project from it, especially in the portions that come into immediate contact with the foreground forms. Therefore in a subject composed of foliage, the leaves of the more distant trees must be partially suppressed as they approach the outline of those nearer the eye; and this requires the more careful attention when they are within twenty or thirty yards' distance, as the effect of this optical law is most evident in the immediate foreground. But even in the extreme distance some deference should be paid to the rule; and if one mountain has to appear separated from another, the outline and details of the more distant should be treated with greater delicacy as they approach the edges of the nearer forms.—GREEN.

53. FINISH IN PICTURES.—Nearly all great artists have begun by putting as much finish into their works as their eyesight would let them.—ELLIS.

FINISH IN PICTURES—*continued.*

Elaboration is not beauty, and sand-paper has never finished a piece of bad work.

Put in only such details as will help the masses. Don't have your work *all trills.*—HUNT.

Every artist has his point of limitation, his finishing point, and he also has his point of imitation, beyond which he does not think fit to follow nature.—HAMERTON.

Most photographers are at first so astounded at the detail-giving possibilities of modern lenses that they feel irresistibly urged to display these powers under all circumstances and to their utmost limit. This may be regarded as an infantine disorder—photographic measles. After this comes a time when the lens is used as a tool rather than a toy—a means to an end, and not the end itself.

54. SURFACE TEXTURE.—The quality of a material is known and recognised by its local variations of shade. For instance, satin, silk, wool may all be in the same shade, but the variations of shade (sheen, etc.) indicate the nature of the surface. Observe this in the bark of different trees, surface of leaves, massed foliage of distant trees. "Take care of the shades, and the lights will take care of themselves"; or *expose* for the darks, etc., etc., also *develop* for gradation in the shades, etc.

55. SURFACE APPEARANCE OF THINGS.—Ask a painter who possesses the true instinct of his craft what it is in nature that he desires to reproduce, and he will answer that it is the surface appearance of things; not their form, their colour, their texture, their light and shade, severally and singly, but all these fused into one general impression. . . .

Such work as this, that gives back nature just as she is seen, in the most direct and simple manner, is the crown and flower of the painter's craft. The secret of it lies in not troubling about the facts of nature, but devoting attention to her outward seeming. All the painter need strive to do is to reproduce for us the appearance of objects as visual impressions.—G. BALDWIN BROWN.

Keep the impressions of your subject as one thing. . . .

It is persistent love of a thing that tells finally. And we are helped immensely by putting down our impressions.—W. M. HUNT.

56. THE QUALITY OF SHADES IS LARGELY DEPENDENT UPON THEIR DISTANCE.—Or we may otherwise express it, that distance is largely expressed by the quality of shade. The difference of this "quality" is twofold. First, there is in distant objects a less degree of actual contrast. For instance, consider a chalk cliff with dark grassy top in the immediate foreground, and a similar cliff in the extreme distance. In the foreground we have a strong well-marked contrast of nearly white paper and a decided grey tone. The same two things seen at a distance are nearly the same tonal value; in actual colour a pearly blue grey, or in monochrome a grey pearly white. Second, there is another well-marked difference in quality of near and distant shades, a surface-texture quality. In the near chalk

cliff, although generally it is a strong white, yet there are many variations there seen, while in the distant case it is an even flat tone devoid of surface quality. We see this in a sun-burnt grass field, where the foreground shows us grey lines, but in the distance only a grey general tone. In painting in water-colour we get this distant effect by thin washes (which are soaked into the paper) one on the top of the other (often with "washing out" with clean water in between the various colour washes), but the foreground is treated with firm handling, more decisive, crisp, and direct. In charcoal, chalk, or pencil drawing the distant tones must be worked into the grain of the paper, but the foreground is worked on the tops of the elevations of the paper.

In photography due regard must be paid to the question of accommodating the roughness and smoothness of the grain of the paper to the desired effect. The foreground and distance cannot in any well-composed subject be of equal importance. One or other must be the more important, and this should in many cases give the clue as to choice of printing process, grain of paper, etc.

57. DISTANT OBJECTS.—The difference between shadow and light is less sudden and less strong in distant objects than in near ones. . . . It is almost impossible to exaggerate the importance of representing this quality of delicate difference (or simplicity) of tone in distant objects, especially in monochrome, where the greys and purples "of aërial perspective cannot be represented."—T. J. ELLIS.

One thing is very certain, that you must not have two principal objects, or points of equal interest; the division of interest would destroy itself. The eye would wander for a resting-place. There must be a culminating point, essential and determined.—H. WARREN.

Light and shade in nature have each their characteristic qualities. Light is ever accompanied by the exhibition of form, and shade by its obscuration; or, in other words, the enlightened part of an object is full of details expressive of its character, and these details are absent, more or less, from those parts which are in shade.—N. E. GREEN.

58. LOCAL COLOUR CAN BE INDICATED BY SHADE.—The new patches of clean yellow straw on the old brown roof can be indicated by differences of shade. Their relative values are the indicators of their colour. Or the rain marks on the whitewashed wall are again alone indicated by variations of shade. Orthochromatic photography frequently can, under proper conditions, very faithfully render the values of local colour. It was this defect, in the early days of photography, that gave artists so much cause for their frequent charge of "falsifying values," "inverting colour relationships." This is a point to which the amateur does not give sufficient attention. Ruskin draws pointed attention to this failing on the part of photography, and makes it one of the two chief reasons why photography fails to take a place alongside painting. First it falsifies values, and secondly it deals with the externals of things in an impersonal way, while a painter expresses his own feelings and sentiments called forth by the work in hand.

59. **STRENGTH OF TONE.**—The strength or effect of a certain patch of tone (not colour, but relative light or dark) is dependent upon its size, its degree, its surroundings, or contrast. Thus a small patch of dark on a light ground is as "telling" as a larger patch of lighter tone with the same surroundings. Again, a small patch of grey on white ground may be as "telling" or "strong" as the same sized patch much darker, but surrounded by a proportionally darker ground. This principle is of far-reaching importance when considering the introduction or omission of strong points of light or dark in the foreground. A point may be emphasised or subdued in this way by giving it strong contrast or merging it into its surroundings. Also note that the strength of tone is a strong indication of distance. The difference of strength of tone of any two objects is reduced as their distance from the spectator increases. Hence tone contrasts suggest relative distances.

60. **VALUES.**—Each varying tone has a relation to every other that gives a value to it, which is marred or frequently lost altogether if it is not truly rendered. This is so well understood in France that special study is given to relative tones or "values" till a mastery is obtained in dealing with them, and that gives the great strength of the French school as opposed to the English. Choose a subject where the relative tones are simple and plainly marked, and the masses are not too complex.—ELLIS.

61. **USE AND BEAUTY.**—It is curious and helpful (*i.e.*, suggestive) to notice that use and beauty more often follow than accompany each other, *i.e.*, that what has ceased to be useful may become beautiful. For instance, a ruin which no longer is useful may, by force of surroundings, associations (romantic, historic, etc.), be beautiful, or at least picturesque. Manners and customs at one time of use are now picturesque. Hence the charm of historic fiction.

Again, the contrasting of the useful with the picturesque often serves to emphasise the beauty element in the latter. For example, a bit of rough uncultivated land surrounded by well-tilled fields is advantaged by its surroundings.

The element of time also is a factor, *i.e.*, things which may still retain their use but have ceased to be generally used by reason of being superseded by other things become surrounded with the associations of the picturesque. For instance, an old wooden pile bridge over a stream may still be usable, but generally abandoned for a modern iron structure. The age element tends to give the former some attractiveness.

The mental power of perceiving beauty usually follows that of appreciating utility. The latter is the product of a more advanced form of culture. The same bit of moorland which to the poacher is only a place where game may be caught, or to the quarryman a place for "getting" stone, may to the poet or painter be a scene of beauty.—FOUNDED ON H. SPENCER.

62. A PICTURE—WHY IT PLEASES.—A good picture pleases us not only by the beauty of its form and colour, and by the interest of the scene it depicts, but also by the consciousness that we have of the human skill that has gone to make it. We take a pride in it, in that it is the work of a man like ourselves.—JOHN COLLIER.

63. CONTRAST IS ESSENTIAL TO BEAUTY.—As shade is necessary to give value to light, so is the straight to the curved line, the soft grey subdued tints to the purer, brighter colours. The *piano* to the *forte* passages, the chorus to the solo; the grave to the gay, tragedy to comedy; the stately prose to the tripping verse. It is by opposites, *i.e.* contrasts, that all estimations are formed.

64. CONTRAST IN PICTURES AND IN NATURE.—It must be recollected that a picture has generally to be seen in a room that is darker than the darkest cast shadow out of doors, and must be painted so as to look well in that comparative gloom—this is obtained by making the relations of shadow to light and of colour to colour more intense, while the general tone has to be made lighter than what looks true out of doors.—ELLIS.

65. CONTRAST.—All measurements, comparisons, and standards depend on the contrasting of two different things. For instance, the curve-*ness* of a line is estimated by contrasting or comparing it with a straight line. The lightness or darkness of a mass is estimated by comparing or contrasting it with something lighter or darker, and so on with mass, form, colour. Hence the idea of contrast is based upon comparison of different things. In other words, contrast is due to variety.

Much of the charm of all art work, pictorial, dramatic, is due to the contrasting of different things—*art*fully, *i.e.*, with such art that the spectator is so pleased with the result that he does not stay to ask how it is done.

Violent contrasts are seldom pleasing in nature or art. They betray themselves. Many photographers fail by reason of excessive, forced, unnatural contrast, *e.g.*, noisy sunset skies, silhouette figures, etc.

66. COMPOSITION—WHAT IS IT?—Ruskin's answer is as good if not better than any other. He says: "Composition means, literally and simply, putting several things together, so as to make *one* thing out of them; the nature and goodness of which they all have a share in producing. . . . It is the essence of composition that everything should be in a determined place, perform an intended part, and act in that part advantageously for everything that is connected with it; . . . every line and colour is so arranged as to advantage the rest. None are inessential, however slight; and none are independent, however forcible."

67. COMPOSITION—TWO CHIEF PARTS.—The first business of composition is to decide *what* is to be composed, and then *how* it is to be composed. In other words, selection (and consequently rejection) must precede composition or arrangement.

68. COMPOSITION, RULES OF.—Any rules or laws or canons of composition must by the nature of the case be negative rather than positive; *i.e.*, they say what must not be done, and leave it open to the artist to use his own taste as to how certain offences are to be best avoided. For instance, one very elementary and universally accepted rule is, never place the principal object (of size or interest) exactly in the middle of the picture, either vertically or horizontally; and this rule applies with special force to an object of a straight line nature, the more especially if it reaches near to the margins of the picture. Such, for instance, as a long, straight, bare tree trunk, tall spire or tower, or a long row of buildings, a hedge, line of trees, sea horizon. Sir Joshua Reynolds has said, "Every opportunity should be taken to discountenance that false and vulgar opinion that rules are the fetters of genius. They are fetters only to men of no genius."

69. COMPOSITION, LAWS OF — NOT PICTURE-MAKING RECEIPTS.—Not a few photographers have the idea that the laws of composition are *formulæ* whereby pictures can be made. This is no more the case than that the laws of syntax and prosody are receipts for "making poetry." Moody points out that the laws of composition are founded on laws of nature, *e.g.*, balance, radiation, etc., etc. For the most part these laws are in reality no more than a general statement of how the majority of artists have worked. They do not aim at saying how a thing *must* be done, but rather point to the underlying principle which has guided great workers.

Consequently there is much truth in the saying that the laws of composition in art or written language may prevent a man going wrong, but will not tell him how to go right. They will tell him what others have done, but not what he must do. "If pictures were made like puddings, by receipt, there would be no art required."

70. SELECTION OF SUBJECT.—Any hint or help on this topic of fundamental importance should be carefully treasured up. Armitage on this point gives the following advice:—Whatever be your subject, the utmost care should be given in selecting a subject which gives unity of action. If there is a story in your picture there must not be more than one. If in the secondary groups or parts there is by-play matter of interest, they should be in some way not only connected with the principal group or theme, but also unmistakably secondary in importance or interest. There ought not to be any hesitation in the mind of the spectator as to which is the centre of interest, chief group, object, or person of importance. All secondary groups, figures, parts, accessories, etc., ought to assist in concentrating interest in the chief focus of interest of the work. Any part which attempts to rival in interest or importance the chief object or part should be regarded as a usurper and beheaded instanter.

71. SELECTION—WHY NECESSARY.—Holding up the mirror to nature is not selection and cannot often result in a work of art. Why is this? There are two chief reasons. *First*, a work of art appeals to

the imagination. This can only be done by and through the imaginative faculty. *Secondly*, a work of art appeals to the intellect also. This again can only be done by and through the intellect. To do this a selection of material is absolutely necessary. Thus on logical ground may it be shown that the first step of any art work must be selective.

72. PRINCIPLES, IMPORTANCE OF.—As our art is not a Divine gift, so neither is it a mechanical trade. Its foundations are laid in solid science. And practice, though essential to perfection, can never attain that to which it aims unless it works under the direction of principle.—Sir J. Reynolds.

73. ARRANGEMENT OF POINTS OF INTEREST IN A PICTURE.—It is an idea well worth remembering that in a well-arranged picture the chief points of interest are never situated at equal distances from each other. If a very brief and small sketch be made of a work of art just indicating only the relative positions of the points of interest or accentuation, either by form, mass, light and shade, subject, interest, etc., and these points be connected by lines, these lines will be found of unequal length. Also, often it will be observed that these lines form a rough zigzag step-by-step sort of path from the foreground through the middle to the extreme distance. Such a brief analysis of a picture is often instructive, helpful, and suggestive. In our own work it helps to show any formal geometrical or symmetrical arrangement. It also helps to point out what may advantageously be omitted.—N. C.

74. A HINT IN COMPOSITION—LIKE CURES LIKE.—It sometimes happens that in a certain subject we have one objectionable feature—say a telegraph post—that cannot possibly be avoided. It will at times be found that the bad effect of this one feature can be very considerably reduced by introducing other objects of a like or similar nature, so that the one becomes lost in the many, the irritation is cut up and distributed. Thus three or four such posts may be introduced with a good effect, whereas one would be strongly disadvantageous.

75. BALANCE OF THE TWO SIDES.—Suppose an imaginary line drawn vertically *about* the middle of the picture. It is seldom or ever a good composition if all the interest be wholly on the one side or other of this line. Moreover in no conspicuous work of the great masters do we find any *great* preponderance of interest in either of these two halves.

76. BALANCE OF INTEREST.—It is a good general working rule, but with many exceptions, that where a picture contains two groups or masses of interesting matter, the smaller of the two should generally have the greater interest.

77. BALANCE OF STRAIGHT AND CURVED LINES.—If a picture be all curves it is generally weak, and if all straight the picture is harsh and unsympathetic. Nor is the effect good when they are about equally divided. The best results are obtained by a preponderance of curved lines with a few strong and pronounced lines, or *vice versâ*.

78. VALUE OF QUIET SPACES.—For every photograph that has too little subject in it there are ninety-nine that have too much subject. The first lesson every artist has to learn is selection. The great art of selection is knowing what to leave out. The amateur sketcher has this forced upon him in his first effort. The photographer at first tries to get the greatest possible amount of subject on his negative, and it is only after many disappointing (pictorial) failures that it dawns upon him that a small bit is often far better than the whole. Here comes in the great value of plain, quiet spaces—spaces where the eye may rest and not be weary. The value of such patches in the foreground when judiciously placed cannot be over-estimated. As silent intervals accentuate sounds, so these eye-rests enhance the value of the other parts. Very few photographers have as yet at all recognised the value of quiet, plain spaces.

79. BACKGROUNDS.—Nothing is apparent without a background. A white egg against white paper is as nothing.—HUNT.

80. THE FOREGROUND—ITS IMPORTANCE.—In a large majority of pictures which appeal to the imagination, strike the fancy, and are held in memory, the foreground is the part best remembered, the part most essential, the part which first attracted attention. In probably nine cases out of ten the importance of the foreground is considerably greater than all the rest of the picture.

81. FOREGROUND—ONE USE THEREOF.—One of the chief uses of the foreground is that it enables us to add something to the composition so as to give point or emphasis, *e.g.*, to balance the lines, or masses, or lights, etc., of a picture; to give a point of interest, *e.g.*, a figure at a certain point; or hide an undesirable feature or break up an unpleasant line, or emphasise a contrast of light and shade. It is in the foreground that our greatest power of arrangement, *i.e.*, composition, exists.

82. GRACEFULNESS.—Attitudes or movements marked by grace are usually those where a minimum of force is expended. Hence the frequent association of "easy" and "graceful." So that violent exertion or unaccustomed movements are seldom graceful. Thus those who live in mountainous districts generally walk more gracefully than town dwellers, because the springiness so helpful in up and down climbing is unconsciously acquired in hilly countries. Again, those who spend much time in small craft, fisher-folk, etc., unconsciously acquire an instinct of balance which lends an ease and grace to their movements. The importance of balance is appreciated by the skater, fencer, etc. It is this factor which so much adds the *flowing* element of grace, so that one movement or pose melts into another without sudden transition.

83. STUDY OR SKETCH—THEIR DIFFERENCE.—The former is a "finished part" of a picture, the latter is an unfinished whole. They may be compared to a few selected verbatim sentences as compared with an outline of the whole of a speech.

84. STYLE—SIR JOSHUA REYNOLDS' REMARK.—"Style," says he, "in painting is the same as in writing, a power over materials, whether words or colours, by which conceptions or sentiments are conveyed."

85. STYLE AND MANNERISM.—The former is as desirable as the latter is injurious—fatal to greatness; yet the two are often confused, or the words used synonymously. "The former," says Sir Joshua, "is the same in painting as in writing, a power over materials, whether words or colours, by which conceptions or sentiments are conveyed." The latter, says Armitage, "is perhaps the rock on which most rising reputations are shipwrecked, not only in France, but everywhere else." The great Whately said, in reply to a question as to the difference between a *form* and a *ceremony*, "You *sit* upon a *form* but you *stand* upon a *ceremony*." In the same way, we may say, when you work in quite your own way, without affectation or imitation, your work is in your own style, but if you imitate or pretend to be other than what you truly are, you are affecting a mannerism. You possess your own style, but you steal your mannerism.

86. TASTE.—A person who shows no other symptoms of his taste than his cabinet or gallery might as well boast to one of the furniture of his kitchen. I know no other motive but vanity that induces the great to testify such an inordinate passion for pictures.—GOLDSMITH.

87. PICTURESQUENESS.—It is far more a matter of arrangement of treatment of light and shade, or selection and composition, than in some imaginary quality so often supposed to belong to the subject. A sufficiently great artist could present any subject in a picturesque way.

88. ORIGINALITY.—Originality is any conception of things taken immediately from nature, and neither borrowed from nor common to others. To deserve this appellation the copy must be both true and new. But herein lies the difficulty of reconciling a seeming contradiction in the terms of the explanation. For as anything to be natural must be referable to a consistent principle, and as the face of things is open and familiar to all, how can any imitation be new and striking without being liable to the charge of extravagance, distortion, and singularity? And, on the other hand, if it has no such peculiar and distinguishing characteristic to set it off, it cannot properly rise above the level of the trite and commonplace. . . .

Nature presents an endless variety of aspects, of which the mind seldom takes in more than a part, or than one view at a time, and it is in seizing on this unexplored variety, in giving some one of these new but easily recognised features in its characteristic essence, and according to the peculiar bent and force of the artist's genius, that true originality consists.—HAZLITT.

89. LANDSCAPE ART, THE TWO GREAT ENDS OF.—Mr. Ruskin points out, in his famous "Modern Painters," that the "landscape painter must always have two great and distinct ends. The first, to induce in the spectator's mind the faithful conception of any natural

objects whatsoever; the second, to guide the spectator's mind to those objects most worthy of his contemplation, and to inform him of the thoughts and feelings with which these were regarded by the artist himself." In other words, this may be put somewhat thus for the photographic student. First, we must not give an *un—i.e., contra*—natural impression; and, secondly, we must strive to convey to the spectator the expression of our choice of subject and our own impressions of the parts so chosen. Thus is it seen how much does personality enter into real art work.

90. LANDSCAPES, THE USE OF FIGURES IN.—There is no more certain test of a cultivated taste than that displayed by the right or wrong use of figures introduced in landscape. The following considerations show the great importance of the subject :—

(1) Figures when properly introduced may be made to yield the suggestion of life or of movement. In the one case we have an appeal to human sympathies, in the second to human experience and intelligence.

(2) By their costume, etc., they may help to fix the time, locality, or point to some special feature of interest.

(3) By their action, position, etc., they may help to convey the sentiment of the scene, tell the story, explain the position.

(4) They materially assist by giving scale, and so help in forming the conceptions of space, distance, and atmosphere.

(5) They may be made of great use to balance a line or mass, or to accentuate or hide a point, to connect different parts.

91. TREES.—Among the impressions we derive from trees are those of *semi-transparency* in the foliage, and opacity in the stems and branches. Before our portraiture can be complete, ideas of those qualities must be excited in the mind.

The general roundness of the tree depends on the outline being made tender at the top and at the extremities, and gradually becoming darker, and exhibiting the leaves larger towards the middle and lower part of the tree; and displaying the greatest degree of strength in the foliage of the nearest branches, that is on those which come forward towards the spectator, where the leaves would of course be most plainly seen.

The shaded sides of trees are gradually darker from the top towards the bottom, and from the extremities on either side to the centre, not by any sudden or violent transition, but by imperceptible gradation.—J. D. Harding.

92. PICTURES FROM THE POETS.—A study of poetry is helpful to an artistic-minded photographer in two ways. "Poetry," says Hare, "is the key to the hieroglyphics of nature," and every artist is a nature student. If architecture be frozen music, then "poetry is musical thought," as Carlyle puts it, or as Fuller says, "Poetry is music in words, and music is poetry in sound." The study of poetry helps us to find beauty and happiness in all conditions and places. To this

Coleridge testifies thus : "Poetry has given me the habit of wishing to discover the good and beautiful in all that meets and surrounds me." Picture-making is based upon the power of imagination, and to this end again do the poets help us, and Johnson's definition may be recalled, "Poetry is the art of uniting pleasure with truth, by calling imagination to the help of reason." To sum up, then, we may say that poets teach us what to look for, and how to see it.

Secondly, we all know that many a successful picture owes no little of its success to an entirely appropriate title, and on this the poets give us many a hint. It is their business to find the best words for their thoughts. In a word they often supply us with just the very words to express the thing in our minds. To sum up, the poets also show us how to name our pictures :—

The broken sheds look'd sad and strange,
Uplifted was the clinking latch,
Weeded and worn the ancient thatch.
—TENNYSON ("Mariana").

. . . A sand-built ridge
Of heaped hills that bound the sea.
—TENNYSON ("Memory").

See, winter comes to rule the varied year,
Sullen and sad, with all his rising train,
Vapours, and clouds, and storms.
—THOMSON ("Seasons").

When the bright sunset fills
The silver woods with light.
—LONGFELLOW ("April").

The sheltered cot, the cultivated farm,
The never-failing brook, the busy mill,
The decent church, that topped the neighbouring hill.
—GOLDSMITH ("Deserted Village").

No more the glassy brook reflects the day,
But, chok'd with sedges, works its weedy way.
—GOLDSMITH ("Deserted Village").

To-night will be a stormy night.
—WORDSWORTH ("Lucy Gray").

Hail, twilight, sovereign of one peaceful hour.
—WORDSWORTH ("Twilight").

The way was long, the wind was cold.
—SCOTT ("Last Minstrel").

Land of brown heath and shaggy wood,
Land of the mountain and the flood.
—SCOTT ("Caledonia").

When red hath set the beamless sun
Through heavy vapours dank and dun.
—SCOTT ("Last Minstrel").

Now nature hangs her mantle green
On every blooming tree,
And spreads her sheets of daisies white
Out o'er the grassy lea.

—BURNS ("Lament").

Three fishers went sailing out into the west,
Out into the west as the sun went down, . . .
. . . And the children stood watching them out of the town.

—KINGSLEY.

The apparel oft proclaims the man.

—SHAKESPEARE ("Hamlet").

Stern winter now resigns the lengthening day.

—BRUCE ("Spring").

One willow over the river wept,
And shook the wave as the wind did sigh.

—TENNYSON ("Dying Swan").

I love the twilight as thy shadows roll,
Sublimely tender, solemnly serene.

—MONTGOMERY ("Twilight").

A wet sheet and a flowing sea,
A wind that follows fast,
And fills the white and rustling sail,
And bends the gallant mast.

—CUNNINGHAM.

And o'er the furrow'd land,
Fresh from the plough, the dun-discoloured flocks,
Untended spreading, crop the wholesome root.

—THOMSON ("Seasons").

Drink to me only with thine eyes,
And I will pledge with mine;
Or leave a kiss within the cup,
And I'll not look for wine.

—BEN JONSON.

When . . . dark and many-folded clouds foretell
The coming on of storms.

—LONGFELLOW ("April").

The hawthorn budding in the glen,
And milk-white is the sloe.

—BURNS ("Lament").

'Tis sweet to visit the still wood, where springs
The first flower of the plain.

—LONGFELLOW ("April").

Half-robed appears the hawthorn hedge.
—WARTON (" Spring ").

Deep in the shady sadness of a vale.
—KEATS.

The wild brook babbling down the mountain side.
—BEATTIE (" Landscape ").

The clouds consign their treasures to the fields.
—THOMSON.

Roll on, thou deep and dark blue ocean—roll!
—BYRON (" Ocean ").

O winter, ruler of the inverted year,
Thy scatter'd hair with sleet-like ashes fill'd.
—COWPER (" Winter ").

When storms are on the wing.
—MONTGOMERY.

Beneath the umbrageous multitude of leaves.
—THOMSON.

These tattered clothes my poverty bespeak,
These hoary locks proclaim my lengthened years.
—MOSS (" The Beggar ").

The cherished fields
Put on their winter robe of purest white.
—THOMSON.

'Tis brightness all, save where the new snow melts,
Along the mazy current.
—THOMSON.

One wide dazzling waste, that buries wide
The works of man.
—THOMSON.

A man he was to all the country dear.
—GOLDSMITH (" Deserted Village ").

The trees are in their blossom,
The birds are in their song.
—T. J. OUSELEY.

Where the nibbling flocks do stray.
—MILTON.

The hedges luxuriant with flowers and balm
Are purple with violets and shaded with palm.
—ELIZA COOK.

93. EXPOSURE FACTORS.—It is difficult to over-estimate the great importance of timing the exposure approximately correctly. *Something* can be done in development, but a correct exposure is of the greatest assistance. The following factors at least should be taken into consideration :—

(1) Sensitiveness or rapidity of the plate.
(2) Effective aperture of lens or pinhole, etc.
(3) Colour of the subject.
(4) Distance of subject from camera.
(5) Actinic power of the light, *i.e.*,
    (*a*) Latitude of the place ;
    (*b*) Time of year—of day ;
    (*c*) State of atmosphere ; clouds ; fog, etc.
(6) Results desired, *i.e.*, whether increase or decrease of contract required.

94. COUNTING SECONDS.—A bunch of keys, knife, stone, bullet, etc., or any small, heavy object at the end of a string, between 39 in. and 40 in. long, will swing once each way in a second. Or, if the string be just short of 10 in., each journey takes half a second.

95. NUMBER YOUR PLATES BEFORE DEVELOPMENT.—This is best done as soon as the dark slides or double backs are loaded, and just before dusting. For the purpose use a *rather* sharply pointed lead pencil. Number the plates with continuous numbers corresponding to the first column in your pocket-book, or exposure record. A letter (one or two) indicates the brand of plates, and a number follows for the individual plate. Thus, SR 315, *i.e.*, Smith's rapid, number 315. Hold the double back so that the draw-slide is to the right hand, and with the number on the *left hand top corner*, so that whichever way the plate is used, vertical or horizontal, *the number always comes in the sky part.* Being on the film side, the mark does not rub or wash out ; and as the marks need not be any larger than the capital letters at the top of each note on this page, their presence in printing is never perceptible. If the pencil has too sharp a point, or used too roughly, the film is torn and a blister or frilling follows.

96. CONTRAST. EXPOSURE AND DEVELOPMENT.—*Short exposure* tends to emphasise contrast of light and shade, resulting in a hard negative.

Over-exposure tends to reduce contrast, and yields a soft or flat negative.

Quick development tends to reduce contrast.

Slow development tends to delicacy and detail, with longer scale of gradation.

Quick development may be brought about by warming developer, concentration, or excess of alkali.

Slow development may be the result of a low temperature, dilution, or very little alkali and excess of bromide.

97. DEVELOPING SOLUTIONS in cold weather should be slightly warmed, to bring them to normal temperature, say about 70° F. This may be done by standing the bottles in a suitable vessel (jam pot, pie dish, cup, etc.), containing water rather warmer than the desired temperature, say 90—100° F. The dishes, measures, etc., may be slightly warmed by filling them with tepid water. The fixing bath should in like manner have the chill taken off by pouring the fluid into a large bottle and standing it in a warm room. The dish is warmed by filling it with tepid water. Cold usually retards all chemical action, therefore a due allowance of extra time should be made. Extreme cold has been shown to reduce the sensitiveness of dry plates, etc.

98. LOCAL DEVELOPMENT.—Sometimes in an otherwise bright picture we may have one part of non-actinic colour, or a very poorly lighted, *e.g.*, interior of cottage seen through open door. It is desired to accentuate the development of this part without affecting the rest of the plate. This may be done: (1) By tilting the dish so that the developer acts more on one part than another, but no part must be allowed to dry during development. The part to be kept back may be moistened with soft brush and clean water. (2) By the application, by means of a soft brush, of concentrated and slightly warmed developer. (3) By rubbing the part with the tip of a warm finger. (4) Roll up a small tube of paper and gently breath through it warm breath upon the part to be stimulated.

99. NEGATIVES—SOME DEFECTS AND THEIR CAUSES.—*Foggy all over.* excepting where covered by the rebate of the dark-slide or plate holder, indicates that the effect was produced in the camera either by leakage through some hole in the bellows, lens flange, dark-slide groove, or that the plate was over-exposed, or that the sun was shining direct on to the glass of the lens. *If rebates are also fogged*, it indicates faulty dark-room illumination before or during development, or contaminated developer, or excess of alkali, or deterioration of the plate due to age, damp, vitiated air, impure paper in contact with the film, etc.

Abundant detail in the shadows, but lacking in contrast, indicates lack of contrast in the subject, *e.g.*, flat lighting in portraiture, or over-exposure and too much alkali in development, or using a spent developer, or using a weak developer for too short a time.

No detail in the shadows, with excessive contrast, indicates short exposure or too great contrast in the lighting of the subject, or using a developer very strong in restrainer.

Clear shadows and weak in contrast, usually due to too short a time in development, due allowance for the loss in fixing bath not having been made.

Round or oval clear spots, with sharp, dark edges, probably due to air bells clinging to the plate during development.

Fine clear spots, usually due to dust on the plate during exposure, or to sand grains, etc., clinging to the plate during development.

Opaque spots after fixing, caused by sand, etc., in the fixing bath, or using a dirty or spent fixing bath, or due to defective gelatine in the emulsion.

Yellow staining of the film, when using a pyro developer where the soda sulphite has not been sufficient in quantity or defective in quality, or using an old pyro developer, or fixing in a bath that has been used and kept for some time.

General mottling of the film all over may arise from packing the plates in contact with impure or very uneven paper. More often is due to imperfect fixing by using a spent bath or one not containing sufficient hypo, or a hypo bath partly decomposed by acid or alum.

Irregular lines and patches of uneven density, often due to lack of art or dexterity in pouring on the developer at the outset in one steady sweep so that it passes all over the plate in an unbroken wave.

Finger marks, *i.e.*, fine parallel curved lines, due to touching the film with fingers the least bit moist or greasy.

Clear corners, when the lens does not properly cover the plate.

Other defects due to mechanical means, lines caused by using a scratchy dusting brush, or by some projecting part, screw, splinter of wood, etc., inside the shutter of the dark slide; or due to leakage of light along the hinged (folding) part of the plate holder, etc., etc.

100. PINHOLES IN NEGATIVES—CAUSE AND CURE.—Fine transparent spots or "pinholes" on negatives are far too common. Their chief causes are two. *Firstly*, very small air bells clinging to the plate and so preventing the access of the developer. *Remedy*, carefully go lightly over the surface of the plate with a soft brush or a fold of velvet, just before development. *Secondly*, solid particles adhering to the surface of the plate during development. These may be dust from the air, fine particles of wood, due to the grinding action of the edge of the glass plate in the dark-slide, solid material particles in the tap water or developer. *Remedy* is obvious; first dust the plate just before immersing in the solutions, and also filter the developer (see note on filtering, etc.), and use water free from solid particles. This last may be done either by using a tap filter (see note how to make tap filter), or letting the water to be used stand for a few hours in a tall jug, so that the particles may settle to the bottom.

101. TITLES ON NEGATIVES.—It is sometimes desirable to make a print so that the title may appear white on dark ground. This may easily be done thus:—Take a thin piece of glass, *e.g.*, lantern cover glass, lay this on a sheet of white paper; with a fine brush and some *opaque* water-colour (vermilion answers very well) and a little gum arabic water paint the title on the clean glass. As soon as dry turn it over and you have a copy in reversed writing, and all one now need do is to repeat the process on the film of the negative. The thinner the clean glass used the easier it is to see when reversed. A damp sponge removes the colour, so that the same glass may be used *ad infinitum*.

102. AIR BELLS DURING DEVELOPMENT.—Air bells or small round bubbles of air clinging to the plate during development prevent the developer reaching that part of the film surface. On fixing, these round spots show as clear spaces and print dark spots. Whence come these air bells? They are due to two causes chiefly. Firstly, to air in the water; secondly, to the film surface from some cause or other repelling the developing fluid. If water be used from the street tap service at high pressure it commonly contains many small air bells. To get rid of these it will often suffice if the water be drawn into a jug and set aside for half an hour or so with an occasional stir with a glass rod. The air bells either rise to the surface or cling to the walls of the containing vessel—much in the same way that we see the bubbles of gas in soda water. If this fails, the water should be boiled to expel the air and then set aside to cool. This may be relied upon. If, however, the trouble is due to the developer not evenly wetting the film surface, the best course is to give a preliminary wetting in plain water and gently brush the film surface before wetting with a soft dry brush, and again, when in the water, with a tuft of cotton wool. Should the film surface seem at all greasy, then a few drops of alcohol added to the developer will probably remedy matters.

Air-bell markings are sometimes due to frothing of the developer in prolonged development. If the developer be quickly rocked, it has sometimes a tendency (pyro ammonia especially) to get rather frothy. These air bubbles are apt to cling in groups to the surface of the plate and cause markings. Should this happen, the developer should be returned to the cup or measure, the plate rinsed with water, and the developer quickly strained through muslin, or the frothy scum swept off with a bit of paper.

103. A DEVELOPING TRAY, TO EXTEMPORISE.—In case of emergency the following plan will be found effective:—Take a good-sized piece of paraffin wax, say half or more of a paraffin candle; cut up into pieces and remove the wick. Place the wax in a teacup and melt thoroughly in the oven or on the hob. Now take the lid of a plate box, and see that it is sound and free from holes at the corners or edges. Warm it slightly, and pour into it the melted wax, moving it about the while so that *all* parts of the lid are in contact with the melted wax. Allow the wax to penetrate (thoroughly) the card and pour off any superfluous paraffin. Now thoroughly warm the tray and drain from any wax which has not penetrated the card. Let it cool gradually and wash under the tap (cold water) for a minute or so before using for developing.

104. SIMPLE ROCKER FOR LARGE TRAYS.—It is a somewhat tiring affair to hold a large porcelain dish, say 16 by 13 inches or larger, for ten minutes or so and keep the solution moving about from one end of the dish to the other all the time, during development, etc. A very simple rocker can be made in a few minutes from one of those small wooden rollers sent out with some kinds of paper. All one need do is simply

SIMPLE ROCKER FOR LARGE TRAYS—*continued.*

to plane down a strip sufficient to make it rest on the bench without any tendency to roll about. The accompanying sketch will give the idea at a glance. The shaded part is removed with the plane. The strip rests on the bench on the flat side. The developing tray is just about balanced on this rod, and with a finger at each end a large heavy tray can be kept rocking without any trouble at all. In fact, one hand is often quite enough. This kind of rod may often be met with at the oil shops, and is sold for putting into the slot of a window blind.

105. RETOUCHING, TO PREPARE A FILM FOR.—(1) Dip the tip of the finger in very finely powdered resin or in fine Tripoli powder, or very fine pumice powder, and rub gently in a circular direction.

(2) Dissolve a bit of resin the size of a hazel nut in an ounce of turpentine, and apply a few drops with the aid of a piece of soft flannel.

(3) Another retouching varnish may be made thus:—Sandarac 1 oz., castor oil 1 drachm, alcohol 5 oz.

(4) Canada balsam 1 part, turpentine 50 parts.

(5) Finely powdered cuttlefish sifted through a double thickness of the finest linen, and applied with tip of the finger and gentle rubbing.

106. HINT FOR RETOUCHERS.—We often want to apply the retouching or "toothing" varnish to one small part, say one head in a group. For this, and all like purposes, it is most convenient to do so by means of a glass rod with round ends. (How to cut and make a glass rod, see Notes 183-4-5.) For this purpose a rather slender rod is preferable, and it is most convenient to bore a hole in the cork of the bottle, and pass the rod through the hole. By this means we keep the rod clean, always at hand, avoid touching the sticky cork, and can apply a large or small drop exactly where it is wanted on the film. Having applied the retouching varnish, let it evaporate, say for half a minute, then take a bit of clean rag, and, with a circular motion, begin with the drop or drops, and always working in larger and larger circles. Do not begin working with the pencil until the varnish has ceased to feel sticky.

107. RETOUCHING PENCIL, TO SHARPEN.—It is often a great convenience to have several retouching pencils at hand, of varying degrees of hardness, and with different kinds of points. Perhaps the best method of obtaining any desired kind of point (from blunt, fine, sharp, broad, etc.) is to have at hand a piece of rough, of medium, and of fine sand paper, and also a small strip of rather coarse ground glass; with this choice of rubbers any kind of point can be quickly obtained.

RETOUCHING PENCIL, TO SHARPEN—*continued.*

A scratchy point is always to be avoided. The finest work can be done with a long tapering point, which never need be scratchy. When using these sharpening rubbers, keep the pencil constantly turning round and round between the fingers.

108. THE SCRAPER NEEDLE—A RETOUCHING HINT.—It is comparatively an easy matter to fill up a light spot with a pointed pencil when retouching a negative, but it is not quite so easy to reduce in density an opaque dark spot. This can, however, be done with a little patience and the instrument which any reader can make for himself in the following way :—Take a stout sewing needle, say a No. 1 or No. 2. Hold it in the candle or gas flame until one end is red-hot, using for the purpose a pair of pliers or pincers. Then firmly press the red-hot end into the blunt end of a wood pen-holder (without the metal fitting) and leave only about three-quarters of an inch of needle (the head end) projecting. Nip off with a pair of cutting pliers the eye of the needle. Then on a hone or any hard stone grind the projecting point into a double-edged blade similar to what one sees sold by stationers as an erasing knife. The accompanying sketch will give the idea of the form of blade. The part near the end, but not quite the end, is used for lightly and patiently scraping away the film. In this way many negatives may be greatly improved.

109. TO BLOCK OUT A SKY.—If the sky line is soft, then let the blocking-out be done with orange paper, carefully cut to the right size and shape, and applied to the glass side of the negative by means of a touch of "stickfast" along its extreme edges.

But if the sky line be clearly, sharply defined, *e.g.*, as in some architectural subjects, the exact outline must be stopped out on the film side. For this purpose it is very convenient to use (moist colour) vermilion, applied by the aid of a finely pointed brush. The colour must not "run," and should be applied with a nearly dry brush ; a little gum arabic in the water tends to prevent the colour running. It is only necessary to put a line of about a quarter of an inch wide all along the part to be blocked out. The rest may be more quickly and conveniently done by orange paper on the glass side of the negative.

110. MATT VARNISH, TO COLOUR—A PRINTER'S HINT.—It is probably in the after treatment and printing of a negative that the real skill of a man makes its mark. Any hint upon this topic is valued chiefly by those who already know most about such subjects. It is not very generally known that ordinary matt varnish will dissolve a certain quantity of metal iodine. This renders it a yellow colour, and causes it to stop much more printing light than does the ordinary matt varnish. Proceed thus :—To two ounces of ordinary matt varnish add a few flakes of metal iodine. Shake gently, until a saturated solution is obtained

MATT VARNISH, TO COLOUR—*continued.*

(a little iodine goes a long way in the matter of colour); when saturated, take half an ounce and add an equal quantity of white matt varnish. To another half ounce add double its quantity of the colourless varnish. We have thus four grades of colour, viz., saturated, half saturated, one-third saturated, and clear. They may be applied to the *clean* glass side by the aid of a fairly large camel's-hair brush. Any excess when dry may be scraped away with a knife, and the part cleaned with a bit of rag moistened with methylated spirit.

111. STRONG OR WEAK NEGATIVES, TO PRINT.—The majority of amateurs drop into the habit of using only one printing process for all their negatives, be they vigorous and strong in contrast, or thin, flat, and weak, with results very greatly varying in success. By adapting the printing process to suit the character of the negative, good results may be obtained by a suitable process from a negative, which are practically impossible with certain other processes.

Supposing we had a series of negatives, commencing with the thinnest, flattest image, and gradually increasing in contrast and vigour up to strong blacks and clear glass. We may arrange our printing process in a corresponding order, somewhat thus :—

English collodio-chloride	The thinnest negative.
Foreign ,, ,, ...	Slightly less thin.
Strong P.O.P. and gelatino-chloride papers generally ...	Thin, but full of detail.
Platinotype, cold CC	Soft, delicate negative, tending to thinness.
Bromide contact (gaslight printing)	A moderately thin negative with detail, but some range of contrast.
Platinotype cold AA	A medium soft negative.
,, sepia, or black and white hot bath	A medium negative, neither flat nor hard, preferably tending to vigour.
Bromide, daylight contact	A fairly strong negative.
Carbon contact printing	About the same, but not very dense in any part.
Albumenised silver paper	A fairly plucky negative, but not yellow stained.
Silver paper sensitised on weak bath	From medium to hard and strong.

Note.—In sensitising either carbon or plain silver paper, the strength of the sensitising solution should be adapted to the negative. In carbon the bichromate may vary from one to five per cent., according as the negative is hard or soft, three to four being, as a rule, a good all-round working strength. Similarly the silver nitrate may vary from 30 to 60 gr. per oz. for hard or soft negatives ten per cent., or, say, 45° gr., being a good average strength.

112. PRINTING AND DENSITY.—*A very hard negative*, giving strong contrasts, yields best results in a strong light, *i.e.*, direct sunlight.

A very weak negative, thin and poor in contrast, should be printed in a weak light, or under one or more thicknesses of tissue paper.

A medium negative yields best results in good diffused light, *i.e.*, reflected from white clouds.

Printing under *green glass* is said to improve the contrast of flat negatives, due to over-exposure.

113. CRACKED NEGATIVE, TO PRINT.—If the glass be cracked, but the film intact: (1) Try printing the negative in a fairly long room, placing it facing the light, but as far from the light as possible. (2) Try printing it when placed at the bottom of a deep narrow box with darkened sides. (3) Or what is equivalent to the same thing, viz., make a square tube of dark card 2 or 3 feet long, and just large enough at one end to take the printing frame. (4) Or print the negative in diffused light when covered over with one or two thicknesses of ground-glass or tissue paper. The object to be attained is to prevent light being reflected from the bright surfaces produced by the fracture of the glass.

114. ALBUMENISED PAPER, EXPANSION OF.—Many amateurs do not seem to know that the ordinary albumenised (silver sensitised) paper does *not* expand equally in all directions. This may easily be shown by the following experiment:—Cut a long strip, say 15 inches long by 1 inch wide, from the long way of the paper, and mark it L, so that it may afterwards be known; then cut another strip exactly the same length and breadth from the width of the paper, and mark this W. If these two strips are now thoroughly soaked in water to their full power of expansion, it will be found on comparing their length that the one marked W is a trifle the longer of the two. In other words, the paper expands more along its width than it does along its length. Hence, if a portrait negative be printed first on a piece cut the "long way" of the paper, and then on another the "wide way," and the two toned, etc., and mounted side by side, it will be seen that the "long way" piece has rounded the face, and that the "wide way" piece has elongated the head.

115. ALBUMENISED SENSITISED PAPER, TO STORE.—This keeps best when fairly dry and with as little exposure to the air as possible. Place the sheets face to face, roll round a wooden roller previously covered with *dry* paper, finally enclose in two or three thicknesses of orange paper, tightly rolled. If cut sheets are to be stored, place between a couple of old negatives in a printing frame with strong spring, and put in dry, dark place.

116. MOONLIGHT EFFECT WITH SILVER PRINTS.—Select a subject containing more dark than light parts. Make the print decidedly

darker than for ordinary effect. Wash, tone, fix, and wash as usual. Buy a penny packet of blue dye powder from the oil shops. This will probably completely dissolve in about two ounces of tepid water. If not, try the effect of adding a drop or two of acetic acid. After the print has been well washed, place for a moment between clean blotting-paper to remove surface water. Then transfer to a porcelain or glass dish, and cover with the blue dye solution, keeping the liquid moving and the print constantly turned until dark enough. Lay print on a sheet of glass and remove surface moisture with a slightly damp sponge, sponging the lighter parts of the print very thoroughly, so as to prevent the white paper looking like a blue-tinted paper. The desired effect is not a pale and a dark blue, but a white and a blue-brown. Let the print dry face down on a clean sheet of blotting-paper.

117. SPOTTING PRINTS.—By this term is meant the art of touching up or correcting light spots on prints. This is usually done by applying (by means of a finely pointed, small water-colour paintbrush) little dots or patches of colour to match the surrounding tone colour. The most useful (moist) colours for silver prints are lampblack, cobalt, lake, burnt umber, vandyke brown, sepia, etc. But with the three first named it is generally easy to match any ordinary tone or tint. The chief difficulty the beginner encounters is that of making the colour "take" to the greasy-like surface of an albumen print. One common way of getting over this trouble is to touch the spot with the tip of the tongue—dry rather than moist—and then apply the colour before the place is quite dry.

In order to make the colour have a somewhat shiny appearance, like the rest of the print, it is usual to mix with the colour on the palette a drop of clear but rather thick gum (arabic). If the colour refuses to stick in its place, a little candy sugar should be dissolved in the water.

118. SPOTTING NEGATIVES.—Particles of dust, air bubbles, etc., during development, often prevent the developer reaching small parts of the exposed plate. These in the fixing bath come out in clear spots, so that on the print we get dark spots. The clear spots or spaces must be attended to before satisfactory prints can be produced. This is generally done by applying to the film of the negative by the aid of a finely pointed brush a patch of colour—similar as near as may be to the surrounding deposit on the plate. For this purpose opaque colours are best, viz., lampblack, yellow ochre, light red, vermilion. To make the colour "take" to the film without spreading, it is customary and convenient to use a drop of rather thick gum-arabic solution, and to apply the colour *when the brush is nearly dry*, and in small dots rather than in large patches. It is not of any real consequence to exactly match the *colour* of the negative as it is to match the printing density or transparency of the surrounding parts. Hence sometimes transparent colours are best. Of these lake and Prussian blue are general favourites.

119. SPOTTING PRINTS, ALBUMENISED PAPER.—If any speck of dust or opaque matter gets between the negative and printing paper, the result is a white or light spot or patch in the print. This defect can only be remedied after the print has been toned, fixed, washed, etc., and mounted. With a fine-pointed small brush, a little colour, to match the surrounding tint, is applied. The colours used generally are sepia, black, vandyke, lake, etc., according to the tone-colour of the print. *Moist* water-colours are generally preferred to *cake*, as being more convenient. To make the colour hold to the glossy surface of the print, and *dry* shiny, a slight trace of gum arabic is used. And to make this watery colour *take* on the somewhat greasy surface, a trace of ox-gall is used just to wet the part, or, what is often quite as effective and more convenient, the place is just touched with the tip of the tongue, nearly dry. Due allowance must always be made for the fact that the colour dries a little darker, duller, and colder than it seems when wet.

120. A PRINTING HINT.—Sometimes we require to make a number of prints of the same size from one negative. The following little hint helps to save time and trouble. Having settled upon the size of the required picture, cut a hole this size and shape in a sheet of brown paper. This mask can now easily be adjusted to the required position. With a finely pointed pencil mark the position of the opposite corner (by two small lines at each corner). Now cut all your paper to the (exact) required size. It is then the work of a moment to refill the printing frame by a glance at the corner marks.

Another Method.—Under ordinary conditions these fine pencil marks do not affect the printing quality of the negative ; but if their presence be objected to, a brown-paper marker can be fixed (by a touch of gum or paste) to the glass side of the negative, which then serves as a guide for placing the printing paper.

121. HOW TO OBTAIN A TRIAL PRINT FROM A WET NEGATIVE.—One may at times require a rough print from a negative as soon as developed and fixed, in order to know whether or not to make another exposure. This may be done without in any way injuring the negative, if a little reasonable care be employed.

After fixing, give the negative five minutes at least under the tap with a gentle stream. Meanwhile take a piece of smooth bromide paper. With a pencil mark the wrong side. Soak it in cold clean water for two or three minutes (protected from strong light, and in the dark-room of course). Now in a deep dish bring together the sensitive side of the paper with the film of the negative, avoiding any air bubbles—remove from the water and blot off any moisture from the glass side of the negative. Set the negative in a draining rack and make the exposure with a wax match. Develop the print with metol and fix in the usual manner. A little reasonable care will prevent any injury to the film of the negative.

122. PLATINOTYPE PRINTING—A HINT.—All users of platinotype paper sooner or later learn the importance of keeping the paper dry while in the printing frame. For this purpose you may use (1) the sheet rubber sold for this purpose, or (2) a sheet of celluloid, *i.e.* an old film, will serve, (3) American cloth. This last-named is in many ways admirable. The kind to buy is that which has a smooth, shiny surface, and a thin soft elastic half-woolly back. It is made about 4 feet wide, and costs about 1s. 6d. per yard, *i.e.* about 1½d. or 2d. per square foot. Two, three, or four thicknesses of this behind the paper not only keep it dry, but also form a splendidly elastic padding, giving good contact with the negative. When first bought this material is rather apt to be "smelly," but this quickly goes off if left exposed to a current of air for a short time. Obviously the material itself must be first well dried before use. Leaving it all night in the kitchen will probably do this effectively.

123. CARD MOUNTS, TO TEST.—(*a*) Place a small piece of the mount (say 1 by ½ inch) in a test tube or colourless wine-glass. Cover it with tepid warm water, hold it up against a piece of white paper, as background, and examine closely to see if any of the colouring matter bleeds out.

(*b*) Make a rather light-printed proof, tone, fix, and well wash it, cut in half, mount one piece on a glass (an old negative thoroughly cleaned will do), and the other half on the card to be tested. Use quite fresh starch paste only for mounting. Wrap up in damp, clean, white blotting-paper the two mounted parts, and put away together in a tin box for a week.

(*c*) If the mounts have so-called gilt edges, apply a few drops of nitrate of silver solution (say 1 in 10). Gold is not attacked. Bronze, or very low standard of gold, probably will be indicated by change from gold colour to grey-brown-black.

124. TO MOUNT PRINTS ON TO GLASS.—(1) The glass must be very thoroughly cleaned. To give it a final polish make a creamy paste of whiting and dilute ammonia (1 in 20); wash this off under the tap, using a piece of clean rag.

(2) Prepare a solution of gelatine; the exact strength is not a matter of any great importance, say 15 to 20 gr. of gelatine per oz. of water. Filter this while hot by placing a loose plug of cotton wool in the mouth of the filter tube.

(3) Place the filtered gelatine in a flat dish, which in turn is placed in another dish somewhat larger; for example, the smaller dish being 5 by 4 inches might be in an 8½ by 6½ inch dish. The outer, *i.e.* larger, dish is partly filled with hot water, so as to keep the gelatine solution warm.

(4) Immerse the print in the gelatine, and let it soak until quite and thoroughly permeated by the gelatine solution. Immerse the glass plate in the gelatine solution, bring the print, face down, in contact with the glass plate, carefully avoiding any enclosed air bubbles, etc. Raise the glass plate and print together, letting as much gelatine drain off as possible, and gently squeegee the print into close contact with the glass.

TO MOUNT PRINTS ON TO GLASS—*continued.*

Wipe the face of the glass plate with a hot sponge to remove any gelatine solution, set aside to cool and dry. The plate is finally cleaned with a bit of rough rag dipped in hot water.

Prints so mounted have a very brilliant appearance. They are a shade lighter than when not in optical contact with the glass. This method tends to give emphasis to the delicate detail in the shadow, and is very suitable for architectural or scientific studies.

125. MOUNTING—A PRACTICAL HINT.—When mounting wet prints of any kind, and rubbing them down with blotting-paper, the blotting soon gets damp and rubs either to a fluff or into holes; to prevent this, have next the hand and along the top piece of blotting a piece of thick highly glazed paper, or a piece of thin and smooth American cloth. In either case the hand moving along a smooth surface does not have the tendency either to make fluff or holes.

126. SILVER PRINTS, TO DRY.—Silver prints on albumenised paper, dried as they usually are (if unmounted), *i.e.*, between sheets of blotting-paper, begin at once to curl up as soon as released. The following simple plan will be found to very largely, is not entirely, counteract this tendency. First remove all surface moisture by pressing between dry blotting-paper for a minute. Then take a sheet of dry blotting and roll so as to form a tube about an inch in diameter. Then take a print and another piece of blotting, a little larger than the print, and roll them together round the paper tube. Again another print and blotting-paper, and so on. Then set the tube, with its roll of prints and blotting, aside in an airy place to dry. To prevent the last sheet uncurling, a bit of tape very loosely wound round in a spiral manner will answer. If the prints are allowed to dry, which they will do in a few hours if put in a current of air, they will be found to curl *outwards*.

127. MOUNTED PRINTS (SILVER), TO PREVENT CURLING.—Many non-cockling or non-curling mountants have been described, but as the cause of the trouble is in the unequal expansion of the mount and print the question of mountant is not likely to solve all the difficulties.

Several items may be considered. If the cards are of such a nature that they can be thoroughly damped (with a sponge) before using, they will contract on drying very much as the print does.

Another method is that of arranging so that the mounted print dries in a curved position. As soon as the wet print is put on the dry card it causes it to curl backwards or outwards a little at first. As soon as this takes place fix the mount so that it must dry in this slightly curled shape. This may be done if a book-case, filled with books, is at hand, by catching the edges of the mount between the backs of two books at convenient distances in the same row. Or a thin bit of wood, such as is used for backing pictures, may be used, and a few small strips of thin wood or straw board nailed on it at convenient distances, just enough to hold the print curled outwards. The prints are so held until they are dry, then removed and allowed to quietly flatten themselves by being laid out on a table, etc.

128. STORING SILVER PRINTS MOUNTED.—The best way to keep them flat and prevent the tendency to curl or to cockle is to keep them under pressure, face to face, in pairs. This plan has the advantage of keeping them much cleaner than the ordinary method of facing all one way. A silver print appears to have a perfectly smooth, unbroken surface, but usually its surface is traversed by many fine cracks, which collect and hold dirt in a truly astonishing way.

129. CURLING OF UNMOUNTED SILVER PRINTS, TO PREVENT.—The cause of silver prints curling is largely due to the different degrees of expansion and contraction of the paper and the albumen or gelatine with which it is coated. Something, but not very much, can be done to prevent this inconvenient trick these prints often have. Unmounted prints, after toning and washing, should be removed from the final washing water and laid between quite clean blotting-paper for a few minutes—sufficiently long to absorb all surface moisture; then put between other and dry sheets of blotting-paper and rolled, shiny side out, and so left to dry. When dry they will tend to curl—paper side in—and in that form are convenient to handle; but if left lying about they soon straighten and then begin to curl in the usual inconvenient way. It is not difficult to make silver prints lie flat if a little care be used. Take in the right hand a flat ruler or straight paper-knife, with a moderately *thin but not a sharp* edge. Lay the print face down on two or three thicknesses of blotting-paper; the upper piece must be clean in any case. A coin or other convenient small heavy object at each corner of the print will keep it flat. Seize the left hand side edge of the print with the left hand and bring the ruler gently but firmly down a little nearer to the left hand than is the middle of the print. Hold the ruler edgeways down and slightly tilted over towards the right. Raise with left hand the free part of the print in a direction almost perpendicular to the paper, and draw the ruler with a little but not excessive pressure along from left towards the right. Reverse the print and repeat the operation with the other part. This operation takes much longer to describe than to perform; and with a couple of minutes' practice on half-a-dozen old, highly curved spare specimens one learns one of the chief points that cannot be described, viz., how much pressure is needed. The points to observe are—a thin but not sharp edge, *several* pieces of blotting-paper, just enough pressure, and keeping the left hand well up and rather tightly dragging the print.

130. BACKING PLATES FOR HALATION, ETC.—(1) Of common gum arabic take 1 oz., and dissolve this in tepid water 3 oz. Then dilute ordinary glycerine with twice its own volume of water. When required to back a plate, take of the above solutions equal parts, and with this make a very smooth paste by rubbing into it finely ground ivory black to the consistency of thick cream. Lay the plate film down on clean blotting-paper, and apply a thin coat of the black cream by means of a wide soft-hair brush. (2) Another method consists in soaking carbon tissue (red, brown, or preferably black) in dilute glycerine (1 in 3), and applying to the back of the plate with a squeegee. (3) A third method

is a modification of the first already given. A solution of gum arabic (1 in 4) in water is mixed with half an ounce of glycerine and brushed on to black wrapping ("needle") paper. This is applied to the back of the plate and well rubbed with the tips of the fingers to drive out all air bubbles and secure optical contact.

131. BACKING PLATES FOR HALATION—AN IMPROMPTU.—Sometimes when away from home and out of the reach of most of the materials for preparing anti-halation mixtures, it may be useful to know of one method which, while not being perfect, is a very great deal better than nothing.

Cut a piece of orange or black paper, such as is usually used for packing plates, about a quarter of an inch less each way than the size of the plate. Thoroughly saturate this (by rubbing into it with the finger tip) with ordinary glycerine. In the dark-room lay the plate film down on a bit of clean red blotting-paper. Place the glycerined orange or black paper on the (glass) back of the plate, and rub well into contact, commencing always from the centre and working outwards. Over the glycerined paper place a piece of blotting-paper, then a sheet of smooth shiny note-paper, and rub firmly with the edge of the hand.

132. BACKING PLATES.—It is important, when applying any of the ordinary sticky mixtures (caramel *et hoc genus omne*) to the glass side of a plate, to prevent—or at least mitigate—halation, to avoid getting any of this material on the film side of the plate. The simplest way to do this is first to cut out of stiff card, *e.g.* straw-board, a hole just the size of the plate to be backed. This should be just an easy fit, but not at all loose. Now lay down on some flat surface a sheet of *clean dry* red blotting-paper, then the plate, film down, on the blotting-paper, then the card with opening so that the plate exactly fills the opening. Then apply the backing by means of a brush. Remove the card and set the plate to dry, as it now rests on the blotting-paper, on the shelf of a dark cupboard. Obviously it is an advantage to have the card as near as may be the same thickness as the glass. It can be used again and again, but the edges should be wiped with a bit of rag directly after using.

133. GLITTERING OBJECTS, TO PHOTOGRAPH.—The nature of the difficulty of each case varies very much. The first thing to be done is to try and avoid the glitter by rearranging the direction of light. This may often be done when dealing with small and movable objects, glass and china curios, silver plate, ivories, cameos, etc. Or sometimes it is enough to hang up a sheet of the thinnest tissue between the window and the objects. At other times the object may be a fixture, and only one direction of light available, *e.g.*, machinery in a room. If softening and diffusing the light is not sufficient, then the glittering parts must be dulled. Dabbing putty on them is often sufficient for the purpose. Or a *very* thin shower of whiting in fine powder will answer. The whiting or prepared chalk is finely ground, tied up in two thicknesses

of fine muslin, and tapped with a stick, so causing a fine cloud of the whiting to fly about and settle on the glittering parts. If the objects are brightly polished silver or gold, etc., vessels, sometimes it is possible to obtain pieces of ice to put into them. This quickly brings down the temperature, and so causes to condense on their surface a fine covering of minute dew-drops, so giving them a frosted appearance.

134. COLOURED FOG ON NEGATIVE, TO REMOVE.—**(A) Green.** (1) The most common form of chemical fog is the well-known metallic *green-blue* surface colouration round the edges or more or less all over the film. Many plates only show this when ammonia is used in the developer. Metol with soda carbonate generally yields satisfactory negatives with ammonia fogging plates. Ferrous oxalate, hydroquinone, or eikonogen are also valuable. (*a*) If the fog be not very serious, and chiefly confined to *the edges* of the plate and of an iridescent character (often very strong in old plates or those kept in a gas-contaminated atmosphere), it may be removed by gently rubbing the parts with a bit of soft rag moistened with methylated spirit. (*b*) If the fog extend all over the plate and be of a decided green tint, then you may apply the following :—Iron perchloride 10 gr., potassium bromide 6 gr., water 1 oz. As soon as the colour has disappeared, wash well under the tap and apply a ferrous-oxalate developer, and pass through a *clean* fixing bath and wash as usual.

135. COLOURED FOG ON NEGATIVE, TO REMOVE.—**(B) Red.** Prepare a solution of potassium cyanide (a strong poison) of 10 grains to the ounce of water. Having softened the gelatine by a preliminary bath of water, apply the cyanide solution, and remove as soon as the colour is nearly gone. Wash well. Avoid needless contact of the cyanide with the skin, especially if cut or broken, as much as possible.

Before attempting to treat a negative for fog disease, always take a trial print. Many negatives that are badly fog-discoloured yield admirable prints. This is even the case with dichroic (two coloured) fog, *i.e.*, *green* when looked *at*, *red* when looked *through*.

136. FOG, TO REMOVE FROM NEGATIVE.—(1) It may happen that we have a negative fairly satisfactory with the exception that it has a slight general fog-veil all over it. This may be due to defective dark-room light, or stray light when changing plates on tour, or from general light fog in the camera when a very bright cloud, etc., or direct sunlight renders the lens slightly luminous. Prepare this solution—Iron perchloride 10 gr., water 1 oz. Place the negative in clean water until the gelatine is soft and the water flows over it freely. Drain off the surface water and flow with the iron solution for half a minute, and then wash well under the tap and examine the negative by holding it in contact (not film side, of course) with a piece of opal glass. The negative may now be free from any visible fog. Now pass it through a clean fixing bath for five minutes and wash again.

FOG, TO REMOVE FROM NEGATIVE—*continued.*

(2) Another method of general reduction may be tried as follows :— Take of a clean fixing (hypo) bath enough to thoroughly cover the plate, which has been previously well wetted (as above mentioned), and for each ounce of hypo bath add ten drops of a saturated solution of potassium ferricyanide (red prussiate). The action of this bath is quick when once it begins, therefore the negative must be frequently examined and rinsed under the tap. When all fog has been removed it must be again well washed, and may, if needed, be intensified.

137. (1) **LOCAL FOG** may be removed by applying this hypo and ferricyanide solution (Howard Farmer's reducer) to the part with a soft brush, and washing off as soon as it spreads beyond the part and repeating the process.

(2) Local fog or halation round windows, trees, etc., if slight, may often be removed by gently rubbing the part affected with a bit of soft rag moistened with methylated spirit.

138. **PYRO STAINS, TO REMOVE FROM THE FINGERS, ETC.**— Rub the part with a large crystal of citric acid, and rinse frequently.

139. **YELLOW STAINS ON LINEN, TO REMOVE.**—Apply a hot solution of oxalic acid, and rinse well in hot water.

140. **IRIDESCENT OR METALLIC STAINS, TO REMOVE.**—These metallic-looking stains are usually found round the edges of the negative, and seem to appear more frequently on plates kept some time before using, or kept in a gas-contaminated atmosphere, or after development containing an excess of alkali, especially ammonia. Sometimes these interfere with the printing (or enlarging) qualities of the negative. To remove them, lay the dry negative flat down on some perfectly flat surface, *e.g.*, a sheet of plate glass. Take a piece of fine rag, cover the tip of the finger with it, moisten the rag with methylated spirit, and gently rub the stained part of the film. As the rag becomes discoloured and clogged with the film as it is worn away, a fresh surface must be used. The points to attend to are—keep changing the rag, don't work too wet, and have patience.

141. **OIL STAINS ON PAPER.**—These may generally be removed by applying a thick cream composed of finely ground pipe clay and tepid water. Apply it to the place, let dry, and then brush off.

142. **PAINT SPLASHES ON GLASS, TO REMOVE.**—Wet the paint marks with a saturated solution of washing soda, and then rub with a bit of hard wood or the sharp edge of a coin.

143. **MARBLE, TO CLEAN.**—Of common washing soda take two parts and of finely ground pumice stone and finely ground chalk one part each. Mix these thoroughly together and make into a thick cream with water. With this mixture rub away the stains. To restore the gloss give a final polish with water and Fuller's earth, rubbing lightly.

144. WATER, TO PURIFY.—If you suspect your supply cistern contains any organic matter, have it *thoroughly* cleaned out. Then make of canvas a long sausage-shaped bag with one end open. Fill this with lump charcoal and tie the open end to the supply pipe so that all the water entering the cistern has to pass through the charcoal sausage. A few large lumps of charcoal may be left loose in the water. N.B.—*The gelatine of dry plates is liable to be decomposed by organic matter or small organic bodies in cistern water. Verb. sat sap.*

145. STOPS, TO BLACKEN.—(1) The metal must be made quite clean and free from grease by washing in caustic soda or potash and well washing under the tap. It is then immersed in a solution of copper nitrate (which may be made by dissolving copper in nitric acid and evaporating to blue crystals) and heating in a Bunsen gas flame. The colour first obtained is green, and subsequently a fine black.

(2) Another method is that of using a mixture of silver nitrate and copper nitrates, and exposing to heat until colour of jet black and then plunging into cold water.

(3) Make a solution of sulphate of copper (blue vitriol) in water, and also a solution of carbonate of potassium in water. Mix them. Allow the precipitate of copper carbonate to settle. Pour off the supernatant fluid and wash the precipitate with clean water, and allow precipitate to settle again. Now dissolve the copper carbonate in ammonia (1 to 8), and add when dissolved double as much water. The metal to be stained is suspended in this fluid (cold) until coloured.

146. BLACKING FOR LENS TUBES.—(1) Drop black is mixed with enough freshly made clear hot glue to a thin cream, and applied in a very thin coating.

(2) Lampblack is mixed with thin lacquer by placing them together in a wide-mouthed bottle and adding some fine gun-shot, and shaking all together until thoroughly well mixed. This is warmed and applied to the metal, also thoroughly warmed.

(3) A solution of mercury nitrate is brushed over the brass and allowed to dry. A solution of potassium sulphide is then applied.

147. BRASS, TO STAIN. (Suitable for Pinhole Apparatus.)—For pinhole work the thinner the metal the better. The hole should not have bright edges, and the colouring matter should be as thin a layer as possible.

The brass is cleaned by immersing in dilute nitric acid 1 to 50. It is then immersed in a dilute solution of platinum perchloride or potassium chloro-platinite rendered acid by a drop of nitric acid. The black-brown colour is obtained by heating over a Bunsen.

148. DEAD-BLACK VARNISH FOR WOOD. (Inside camera, etc.)—Take of fine lamp or ivory black (say a teaspoonful), and with a palette or old tableknife and a piece of glass rub it to as fine a powder as possible. Then add, drop by drop, gold size (obtainable at any oil and colour shop), just enough to form a thick stiff paste, and work it well up with the black powder, so that the gold size is evenly distributed

over the whole mass. Now add enough turpentine to make all to a creamy consistency, and apply at once to the wood by means of a stiff hog-hair brush in a thin, even layer, with as little rubbing as possible. If too much gold size is added, it will dry shiny and uneven in thickness. If too little, the black powder will rub off when the turpentine has dried. This is suitable for wood, leather, and metal parts where there is no friction, but is not suitable for stops.

(2) Apply a strong solution of sulphate of iron, and when dry brush on a solution of tannin or of extract of logwood or of extract of hæmatoxylin.

(3) Dissolve sandarac in alcohol, and add fine lamp or ivory black; apply with a brush. This dries hard and well, and may be applied to wood or metal.

149. PAPER, TO RENDER WATERPROOF.—(Paper so prepared has many uses in the dark-room, *e.g.*, to protect the wall, etc., from splashings from the sink, etc., etc.) In a pint of water dissolve two ounces of alum, and stir in rather less than an ounce of Castile soap in thin shavings. Then dissolve half an ounce of gum arabic in a pint of water, and add half an ounce of laundry "blue." Mix the two solutions when warm. Dip the sheets of paper into the combined solution and soak until the fluid renders the paper limp. Hang up to dry in a warm place.

150. TONING BATHS FOR SILVER ALBUMENISED PAPER.—(1) Gold, 1 gr.; chloride lime, 1 gr.; chalk, 1 teaspoonful; water, 16 oz. Make with hot water, and use when cold, or make with cold water and use next day. Gives black tones.

(2) Gold, 1 gr.; soda acetate, 30 gr.; water, 10 oz. Prepare at least one day before using. Purple tones.

(3) Gold, 1 gr.; chloride lime, 1 gr.; chalk, 10 gr.; soda acetate, 10 gr.; water, 10 oz. Prepare a few hours before required.

(4) Gold, 1 gr.; soda carbonate, 10 gr.; water, 10 oz. Use at once. Does not keep. Gives brownish tones.

(5) Gold, 1 gr.; borax, 60 gr.; water, 10 oz. Make with warm water; use when tepid cold. Does not keep. Brown tones.

(6) Gold, 1 gr.; soda phosphate, 50 gr.; water, 10 oz. Prepare a few hours before required. Black tones.

(7) Gold, 1 gr.; soda tungstate, 30 gr.; water, 10 oz. Prepare a few hours before use. Brown-black tones.

151. GOLD TONING BATH, TO CORRECT ACIDITY.—An hour or so before the bath is to be used add to it a teaspoonful of finely powdered chalk ("prepared chalk"). Shake up well, allow the chalk to subside, and pour off the clear solution for use.

152. VARNISH, TO REMOVE FROM A NEGATIVE.—Place the negative in a porcelain, or glass, or vulcanite, but *not* celluloid dish. Cover with methylated spirit and rock gently, and cover over with a bit

of card to prevent needless evaporation and smell. After, say, five minutes, rub with a tuft of clean cotton wool. If the varnish is not entirely removed, add a little more spirit and a few drops of strong ammonia, rock gently, and again rub with the plug of wool. After all the varnish is removed, rinse in clean methylated spirit, and blot off with clean blotting, again rinse with spirit, and dry spontaneously.

153. BLISTERS.—Plates or films. Generally due to the employment of a very soft gelatine or lack of proper adhesion between the film and its support (glass, celluloid, paper, etc.). They usually appear after fixing and during the washing, and are often caused by the washing water being too warm. Some plates, in very warm weather, first show small pinhead blisters and then dissolve away, leaving clear spots. The remedy is to use the developing solutions at a cooler temperature, and have all the fluids at the same temperature. Something may be done by using the alum bath (common or chrome alum) after development and before fixing.

154. BLISTERS.—Prints on paper support. May appear in toning bath if the temperature be too high or the paper very stale. Are more common in double-coated papers. *Cause,* may be osmosis between the fluids of different densities through the gelatine or albumen septum, as when the print, after toning, is washed and passed into a strong, dense fixing bath, and then into water. Or may be partly due to sudden changes of temperature, *e.g.*, passing from a tepid toning bath into a freshly mixed and therefore very cold fixing bath. Or may be due to gas formed between the paper and its coating, thus lifting up the gelatine or albumen film. If this be the cause, and a large blister be pricked under water, the escaping bubble of gas is seen. The probable or possible cause of this gas may be due to the albumen or gelatine being partly decomposed, or on the point of decomposition, and some ingredient in the toning baths, etc., just being enough to effect the formation of gas.

The best plan in this last case is obviously to avoid the brand of paper. In other cases due attention must be paid to (1) having the various fluids as near one temperature as possible—*i.e.*, mixing the fixing (hypo) bath some hours before use, or using warm water; (2) avoiding as far as possible any sudden changes of density—*e.g.*, when the prints are fixed, gradually dilute the fixing bath with water rather than plunge the prints from the dense hypo bath to water. Various writers and workers have suggested hardening the film by dipping the prints (1) in methylated spirit, (2) or in a mixture of equal parts of methylated spirit and water, or (3) a bath composed of 5 gr. chrome alum, 1 oz. methylated spirit, and 2 oz. water.

155. TRANSPARENCIES, WHITE BACKING FOR.—Make a saturated solution of white wax in ether, dilute this with an equal quantity of ether, and apply to the glass side of the transparency in the usual way (*i.e.*, as though varnishing a negative).

156. DIAGRAM FOR LANTERN PROJECTION.—In Ink. A lantern lecturer sometimes requires to show a sketch or diagram of a piece of apparatus that cannot be conveniently photographed. The object may easily be acquired in the following way:—Dissolve a little gum dammar in benzole, say a teaspoonful of the white gum in a couple of ounces of the fluid. When dissolved, allow the bottle to rest for a day or two, and decant the clear liquid, which should be VERY nearly colourless. Take now a clean lantern-slide cover, and coat it with this solution, being careful to avoid contact with dust, and set to dry. A drawing may now be made with ordinary pen and ink upon this varnished surface.

157. DIAGRAM FOR LANTERN PROJECTION.—In Water-colour. It is very difficult, if not impossible, to place water-colours on glass without their running where not wanted. If the glass be first coated with a very thin solution of gum arabic in water, this trouble is, to some extent, overcome. If it is required to make a diagram of coloured lines, this may be done by using water-colours and strong gum-water, and a fine brush or drawing-pen. One line must be allowed to dry before another is drawn across it.

158. SHADOWS ON BACKGROUND, TO AVOID.—Sometimes—*e.g.*, for diagrammatic or scientific purposes—we wish to photograph some still-life object against a background, but so that it shall not show cast shadows on that background. Two courses are open to us—(1) to use a very dark background when dealing with light objects; (2) to use a light background when the object is dark. First method: Suppose the first a branched piece of white coral; arrange some flat object, a large book, drawing-board, at about 30 to 45° tilt, cover it with black or dark-red cloth or velvet, place the coral resting on it, and below the window, and point the camera down at it. The shadows cast on the dark ground do not show. Second method: Suppose a spray of green foliage to be the object; in place of the drawing-board, support the object on a sheet of clear glass similarly placed, and at some distance behind it, but sufficiently far away that it receives no cast shadows, place a sheet of white blotting-paper. The shadows falling on the clear and clean glass do not show if the lighting is properly arranged.

159. SEVERAL COMMON TERMS FREQUENTLY CONFUSED.—*Filtration*, *i.e.*, separating a liquid from a solid by passing the liquid through some substance (*e.g.*, filter paper, flannel, washleather, etc.), having small interstices which do not permit the passage of the solid in suspension.

Decantation, *i.e.*, separating a liquid with a solid in suspension, by permitting the heavy particles of the solid to subside or settle down to the bottom, and gently pouring or syphoning off the clear fluid.

Levigation, (1) *i.e.*, rubbing a hard substance to a fine powder with the aid of some fluid which does not dissolve the solid.

(2) Separating a light and heavy substance by grinding the two together in a fluid which dissolves neither of them, and then pouring off the water carrying the lighter particles, while the heavy particles sink to the bottom.

Lixiviation, separating two substances by using a fluid which only dissolves one of the two.

160. FRECKLES.—One of the troubles every amateur portraitist encounters is that of freckles. There are several courses open to us to reduce if not obviate this trouble:—(1) We may use orthochromatic plates and a yellow screen; this increases the exposure. (2) We may illuminate the sitter by light passing through yellow blinds of yellow tissue paper. (3) Another plan is to very slightly powder the face with ordinary toilet powder, having a yellow rather than a violet tinge. (4) Some cases may be met by gently but briskly rubbing the freckly part with the hand to stimulate circulation, when the freckles cease showing for a moment. (5) We may retouch them out on the negative.

161. NOTES ON POSING—THE EYES.—The apparent size of the eyes very much depends upon the way one sees them, *i.e.*, they appear smaller or larger as they are turned up or down. Hence people with small eyes should look up rather than down; while large staring eyes are best seen to advantage when glancing downwards with the upper lid rather drooping. Deep-set eyes are apt to come out with excessive shadows, and should therefore be so arranged that the light falls somewhat into the eye-socket, *i.e.*. a front light duly subdued will generally best effect this purpose. While protruding, "full" eyes should be so arranged that they are in shadow, *i.e.*, by arranging the light to fall towards the back of the head or over a shoulder. It is seldom or ever satisfactory to have the head turned one way and the eyes another. This tends to give either a sly, cunning expression, or to suggest mental derangement.

162. DUST IN THE CAMERA OR DARK-SLIDE.—The most prolific source of pinholes (clear, transparent, small spots) on the negative is dust settling on the sensitive film before exposure. Each speck of dust stops the light from reaching the plate. The developer of course fails to act and the spot fixes out a clear space. Dust is difficult to avoid in dry, warm weather, especially near roads where there is much traffic. The following precautions are well worth taking, as a means of reducing if not entirely avoiding this trouble:—

(1) When changing plates avoid a room where dust is in the air.

(2) Keep the plates covered up as much as possible both from dust as well as light.

(3) Dust out the dark-slide before inserting the plates, and go into all the corners, drawing the shutter out to full extent.

(4) Dust out the *inside* of the camera when extended the full draw of the bellows—first with a dry cloth and then a bit of clean rag with *a trace* of glycerine, and get well into the corners.

DUST IN THE CAMERA OR DARK-SLIDE—*continued.*

(5) When the plates are put into the double backs in the dark-room —of course, get as far away from the light as convenient, turn your back to the light—draw out the shutter, holding the plate downwards, and gently go over its surface with a wide soft-hair brush (kept for this purpose only) with gentle downward strokes in one direction only.

(6) Before developing, with the same soft brush again go over the film of the plate to remove any dust which may have settled on the plate after exposure.

(7) When carrying the camera and slides along a dusty road keep them covered up as much as possible. Dust has a trick of finding its way through the finest grooves.

(8) The rough edges of the glass plates working about in their rebates grind up some fine sawdust. If the slides are charged and a railway journey intervenes before exposure, it is well to dust out the slides when possible before exposure.

163. THE DUSTING-BRUSH—A DARK-ROOM HINT.—It is highly important that the plates should be dusted *after* they are in the slides. This is best done by drawing out the shutter-slide, holding the plate towards one and away from the light, and going over it in *slow*, even strokes with a wide, soft camel's-hair brush. Quick dusting induces a slight charge of electricity, and tends to encourage fine dust particles to cling to the sensitive surface. But how easy is it to mislay the dusting brush, or to put it down where it gets wet, and spoils the next plate for which it is used! To obviate this, the following simple plan will be found convenient and effective:—Cut off the long wood part of the brush handle so as only to leave the broader part. Through the end of this make a clean hole, pass through the hole a piece of moderately stout elastic (about 1d. per yard), and tie up this end. On the other end of the elastic make a loop of such size that it just comfortably passes over the top waistcoat button, and of convenient length, but not long enough to dangle into the sink or any wet place. By this means the brush is always at hand when loading slides or removing them for development. When the brush is done with for a moment it can be tossed over the shoulder, when it keeps out of the way until wanted.

164. MEASURES—A DARK-ROOM HINT.—It is not always easy to see in the dark-room the numbers 1, 2, 4, etc., on the ordinary glass graduated measures. One way of making them show better is to point a hard lead pencil and rub it well into the cut figures. Another and better plan is to take a fine small paintbrush and fill in the marks and figures with black varnish (Bates or Brunswick). If the varnish is too thick you may thin it down with turpentine or benzole. Or if you should wish to remove any part of your work the same fluids will serve. The only fluids that you are likely to use in developing that will affect these black varnishes are the caustic alkalies. It is easily renewed if need be.

165. FIXING PLATES.—The time various brands take in fixing varies with several circumstances; *e.g.*, the constitution of the plate, the developer used, temperature, strength of hypo bath, etc., etc. But in most cases the following may be taken as a good practical reliable working rule. Note the time that it takes a plate to *appear* quite free from any visible white (unreduced) emulsion. Then give it at least as long again in the hypo. If the time taken to clear away all the undeveloped part is long, it is a sign that the hypo is weak, or is getting exhausted, or bath too cold. It is much cheaper to be extravagant with hypo. renewing the fixing bath fairly frequently, than to risk spoiling negatives by improper fixation.

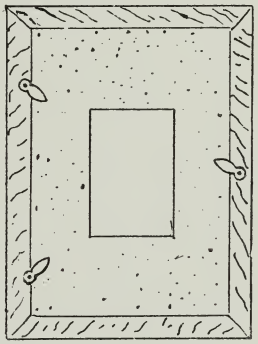
166. TO WASH A PLATE QUICKLY.—It does not seem to be sufficiently recognised by many beginners that a short time in running water more effectively washes a plate than does long soaking with an occasional change of water. When we wish to wash one or two small plates as quickly as possible, this may easily be done in the following way:—Select a shallow dish or tray, preferably one with a lip, somewhat larger than the plates to be washed, say a 10 by 8 inch tray for a couple of quarter-plates. Put the plates side by side towards the lip end, then arrange a fine stream of water from the tap to enter the dish towards the corner opposite to the lip, and under this corner arrange a wooden wedge at such a height that the plates are *only just* covered. A fine stream of water falling on the tray some few inches away from the nearer sides of the plates is thus caused to spread out into a thin even layer of water. This layer of water flows evenly over the film surface and out at the lip; thus the plates are in a constantly changing layer of water, and practically are never soaking continuously.

167. DRAINING PLATES—A HINT.—The usual way is of course to set the plate in an ordinary draining rack, and let the moisture run to and drip off one corner. It may happen that no draining rack is at hand. The next best plan is to drive into the wall, cupboard door, etc., a couple of wire nails, so that half an inch or more of the nail projects. The plate rests upon these nails, cornerways, downwards, and film outside, *i.e.*, away from the wall. This, however, may not be practicable. The next best thing is a strip of the now common corrugated packing paper, used by chemists and others. Instead of resting the plate edgeways on a shelf so that its lower edge rests in a pool of water, just let this lower edge rest on a strip of corrugated paper. The paper absorbs the water as fast as it runs to the bottom of the plate, and the plate is drained quicker this way than when all the fluid has to run to one corner.

168. PACKING PLATES WHEN TRAVELLING.—Experience shows that the tighter (*i.e.* closer) plates are packed the less risk of damage. Harm may come (1) from the sensitive surface getting abraded—thus when the plates are not sufficiently tightly packed to prevent any movement; or (2) by the glass being cracked or broken; this may arise from

curvature of the glass, or uneven pressure, or a sudden "bang"; or (3) by damage through damp, light, impure air, gas, etc. To reduce the risk of injury to the glass, see that the plate boxes, if not filled with the plates, are filled with evenly folded sheets of paper. Put the plate boxes in the travelling kit bag, box, hamper, etc., so that they stand edgeways. Also take care that no part (corner or edge) of a plate box comes within a couple of inches of the box or bag. Between the plate boxes and the walls of the travelling bag there should always be some elastic material, clothes, etc. For this purpose nothing is better than such things as flannels or cloth clothes, with socks, etc., for plugging the corners so that nothing can move about during transit.

169. MASK OPENINGS FOR THE FOCUSSING SCREEN.—When using a large camera, say a whole-plate, for making lantern-slides, it is rather inconvenient, and at times not a little confusing, to be bothered by various sets of pencil lines ruled on the ground-glass, *e.g.*, for half, quarter, and lantern sizes. The following plan will be found a real comfort in working:—Cut a piece of card (preferably any dark colour) so that it exactly fits the visible size of the ground-glass. Then at its centre cut out an opening the size you wish your small picture to be, say 3 by 2½ inches. Now by means of three small "turn-buttons" (about 2d. per dozen) fix this to the inside of the ground-glass. You now need not think about anything but just as much as you can see on the ground-glass. You will, of course, provide yourself with a set of these card masks, so that you can at a moment's notice substitute one for the other. The accompanying sketch will make this matter quite simple and clear. We are looking at the ground-glass, inside of the focussing screen; the dotted portion is the opaque card mask with clear opening showing the ground-glass. The small turn-buttons are fixed on to the wood framework holding the ground-glass.



170. FOCUSSING IN A DARK INTERIOR.—Sometimes the interior of a bulding is so dark that there is great difficulty in securing anything very distinctly on the ground-glass. A few lighted candles placed at varying distances are of the greatest service, as one can then focus on the candle flame. If only one candle can be used, then place it so that it is about one-third of the distance between the nearest and most distant object to be included. For example, suppose the nearest object of any importance is a pulpit 20 feet from the camera, and the most distant object a wall 50 feet. Subtracting 20 from 50 equals 30.

FOCUSSING IN A DARK INTERIOR—*continued.*

Divide by 3 equals 10. Place candle 10 feet behind the pulpit, and focus for the candle at 30 feet from camera. Next to a candle or a wax match, held by a friend, try a piece of white paper with some dark object held against it.

171. FOCUSSING SCREEN, TO RENDER MORE TRANSLUCENT.—In copying a drawing, engraving, etc., where there is not very much light, and it is important to get a sharp focus, it will be found helpful to have a ground-glass stopping very little light. For this end a few drops of glycerine rubbed well into the grain of the ground side, and all superfluous glycerine removed with a clean piece of rag, gives a very comfortable screen for this kind of work. A compound eyepiece must be used of course. If glycerine is not at hand, oil or vaseline may be used.

172. THE SWING-BACK, TO TEST ITS VERTICALITY.—Every practical worker knows (or should know) the importance of having the back vertical when dealing with architectural subjects, and while knowing this he may be unprovided with a plumb indicator or other apparatus for testing this matter; then let him hang a bunch of keys, knife, or any other small heavy object at the end of a bit of string, and he has a reliable plumb-line at once with which he may compare the swing-back. Again, it is often possible to correct the back, vertically and horizontally, by looking along the top or sides, and comparing with some known horizontal line exactly in front (*e.g.*, the horizon line at sea), or some edge of a building at the side. These are, however, only makeshifts, or alternative methods in case of accident, and should not be held sufficient to replace some permanent and therefore always present indicator of some kind, both for adjusting the back horizontally and vertically. This may save much trouble in the matter of measuring and trimming prints (see *Amateur Photographer*, April 3rd, 1896, p. 303).

173. SHUTTER, TO TEST FOR VIBRATION.—If a shutter at the moment of its release, or during any time of its being open, produces vibration of the camera, the sharpness of the image must suffer in consequence, and possibly the lens-maker may get the blame properly belonging to the shutter-maker. It is, therefore, important to test the shutter. This may easily be done in the following manner:—Place the camera on a steady table. On the top of the camera place a small saucer; one of those common little Japanese ash trays of very thin ware is just the thing for our purpose. Now put in your saucer just enough water to cover the bottom—say a tablespoonful or so. Add a few drops of ink. Place a lighted candle in such a position that you see its image reflected by the black mirror surface of the inky water. Fire off the shutter, watching closely the reflected image of the candle flame. You will very soon see if your shutter shakes your camera.

174. WIND SHAKING THE CAMERA.—On windy days it is always advisable to push the points of the tripod legs well into the ground when this is possible. This not only reduces the shakiness of the camera, but lessens the risk of an obvious accident. When this cannot be done, tie a piece of stout string to the tripod top, selecting the triangle end of that leg which is nearest to the direction of the wind. At the other end of the string make a loop just clearing the ground; now place in the loop a long narrow stone, piece of wood, brick, etc., and let the other end of the heavy object rest on the ground.

Again, on windy days, see that the focussing cloth is not flapping about. This is often a cause of blurring of the image. Also much can often be done to shelter the camera at the moment of exposure by standing to windward, so that the body may in part shield the camera.

175. STOPPER, TO UNLOOSE.—Happy is the reader who has never been bothered by an obstinate stopper, *i.e.*, one that obstinately persists in stopping in the bottle neck when we want it to come out. Should this trouble arise, there are several courses open to us:—

Firstly.—Try to remove the stopper by a screwing sort of motion, first one way and then the other.

Secondly.—Wrap a bit of rag round the stopper and try again the screw motion.

Thirdly.—Place the bottle on the table, seize the neck with the left hand so that the ball of the thumb is against one edge of the stopper. With the other hand *gently* tap the stopper in an *upward* direction and opposite to the upward push of the left-hand thumb. For this purpose we must employ *not* a hammer or knife, but some yielding substance, *i.e.*, a piece of wood, *e.g.*, foot-rule, paper-knife, tool-handle; or the edge of the sole of a slipper is a very safe thing to use. If too much force or a non-yielding substance be used, the chances are that the stopper will be broken. If the hand be warm and the neck grasped by the hand, the warmth so imparted is a material assistance, as it causes the neck to expand and so loosen the stopper. Therefore persevere with this method for a minute or two, trying first one side and then another.

Fourthly.—Tie to some firm object, *e.g.*, leg of table, knob of drawer, etc., one end of a stout, *smooth* piece of string; take the other end of string in left hand, pass the string once round the neck of the *bottle*, now held in the right hand, and pass the bottle quickly to and fro so that the friction of the string heats the bottle neck. Every few minutes stop to try the third method. These two methods combined very seldom fail if sufficient patience is also employed.

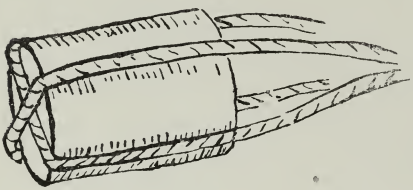
Fifthly.—The heating method may be applied in another way—by holding the neck under the kitchen hot-water tap and letting a quick stream of hot drops fall on it, the bottle being constantly turned round all the time. The water must not be too hot at first.

STOPPER, TO UNLOOSE—*continued.*

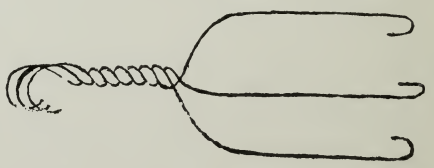
Sixthly.—Should all the above devices fail, the solution method may be tried. This consists of dissolving the substance which has got in between the stopper and the bottle neck and formed a cement. The solvent must, of course, depend upon the nature of the contents of the bottle. The best thing to try first when the bottle contains a liquid is some of the same liquid that it contains. For instance, a saturated solution of sodium sulphite often fixes its stopper, but if the bottle be inserted in a vessel containing water, some of it will probably penetrate between the stopper and neck, and so dissolve the salt precipitated by evaporation. In the case of varnishes, etc., such solvents as benzole, turpentine, alcohol, chloroform may be tried. Paraffin is a good penetrator in many cases.

To prevent stoppers sticking, it is a good plan (when the contents of the bottle do not forbid it) to rub the stopper with a bit of warm paraffin wax or vaseline, and then remove all the superfluous wax, etc.

176. TO REMOVE A CORK FROM THE INSIDE OF A BOTTLE.—The most simple way is to pass inside the neck of the bottle a double fold of fairly strong, fine, but rather *stiff* string, so stiff and springy that when the loops are through the neck and inside they open out somewhat. Inverting the bottle, a few adroit motions will soon capture the cork in the double folds, as shown in the sketch. It can then be easily pulled out by means of the strings.



Another Method (suitable for bottles of opaque material). Obtain three pieces of steel wire—old pianoforte strings will do—soften one end of each piece in a gas or spirit-lamp flame and bend into a small hook. Heat again and plunge into water. Now taking all three hooks, and holding them so that the hooks point inwards, twist the other three ends together. This trident, inserted into the neck of the bottle, will soon extract the cork. The small sketch will indicate the arrangement.



177. CORKS, TO PREVENT GETTING LOST.—Bottles that are often used in the dark-room should have their corks attached to them, so that they may not fall on the floor, roll about, get lost, gather dirt, or cause a sprained ankle when stepped upon. Thread a stout needle with strong thread or twine. Pass this horizontally through the upper part of the cork, and tie in a loop over the top of the cork. Attach the other end of the string to the bottle neck, and do *not* have it so long that the cork can at any time reach the bottom of the bottle, lest it get underneath and cause an upset or broken bottle.

178. HOW TO TAKE A CORK OUT OF A BOTTLE.—Very few people seem to know that there is a right and several wrong ways of putting in and taking out a cork. One way is to force the cork straight down as one drives a nail into a piece of wood. One way of trying to get it out is to "waggle" it to and fro, with almost certainty of breaking it; this is the quickest way to break a cork. Cork being a compressible elastic substance, obviously the simplest way is to insert it with a turning screwing motion, *not* first one way and then the opposite, but always turning it one way, say the same way that the hands of a clock or watch go round. To get this cork out easily, do not think that because you screw it in one way you must unscrew it in the opposite direction. This will jam and break it sooner or later (probably sooner) but take it out by twisting it in the same direction that you used when inserting it—only, of course, pulling slightly instead of pushing. A single trial will convince you instantly. Stress is laid upon this very simple matter, because so few people seem to know it, if one may judge from the number of corks constantly being broken. If you want to get a thin, flat cork out of a wide-mouthed bottle (*e.g.*, such as an ordinary pyro bottle) without breaking the cork, do *not* "dig" it out with the points of a pair of scissors or old nail, but use a corkscrew. Having once got the cork out, then for future use have a bit of thin rag between the cork and bottle, and outside that a layer of thin smooth paper. By means of the rag the cork can then at any time be easily pulled out without breaking it.

179. BOTTLES, TO CLEAN.—The substance to be used for cleaning any bottle must obviously depend upon what the bottle has previously contained. There is, however, one rule of general utility, viz., that the sooner the bottle is cleaned the quicker, easier, and more thoroughly will that operation be performed. Therefore it is a good rule to clean

out every bottle directly it is empty, and not give it time for any of the contents to dry or adhere. If the substance, however, has been allowed to dry to the sides of the bottle, it will be found a good plan to use some solid substance to assist in removing it. Small bits of brown paper, bits of charcoal, small shot, sawdust, etc., according to circumstances, may be employed. Finely powdered coal is also useful sometimes. As to solvents: The first wash out should be with something similar to the previous contents, *e.g.*, if the bottle contained a spirit varnish, then begin with a rinse out of methylated spirit. *Warm* water is best for any aqueous solutions, and so on. Bottles which have contained oily substances should first be washed out with a strong and hot solution of washing soda. After that a solution of caustic potash or soda or ammonia, and again well washed in clean water. If the solution has precipitated some metallic substance inside the bottle, try first powdered charcoal or chalk; then try dilute hydrochloric acid, then strong hydrochloric acid, then nitric acid, then a mixture of these two acids. Care must be used in employing these acids to avoid getting any splashes on the clothes, or to avoid contact with the fingers, or breathing the fumes as much as possible. When any bottle has been cleaned out with any substance other than water, it is necessary to thoroughly wash out the cleaning substance. In the case, for instance, of a bottle having been cleaned with turpentine a wash of methylated spirit should follow this, and then finally a thorough rinsing in water.

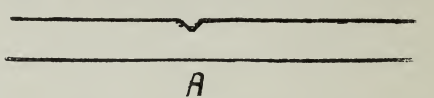
180. PORCELAIN DISHES, TO CLEAN.—The importance of keeping one's dishes as clean as possible cannot be too frequently insisted on. This is comparatively a simple matter if—an important if—they are cleaned at once after use. For this purpose a piece of loofah—a bit too scratchy and scrubby for ordinary use—is just the thing. Some developers and toning baths throw down a deposit which clings to the glaze very firmly if allowed to dry, but is easily removed by the loofah if used at once. For getting into the corners an old tooth-brush is useful. For cleaning the outside, the loofah with a little monkey brand soap will generally be found sufficient. If, however, one gets obstinate stains that soaking in hot water and well rubbing with loofah will not move, then other means must be tried. To the end of a bit of stout glass rod or piece of hard wood tie a bit of loofah or rough rag by means of thin string; into the dish pour a small quantity of hydrochloric acid (the impure commercial "spirits of salts" will do), and with your mop carry the acid all over the inside and especially into all corners. Some care must be used to avoid splashing the acid on to either the fingers or the clothes. Should the former happen, rinse them well at once under the tap; should the latter happen, apply strong liquid ammonia, and dab it again and again with a rag, first dry and then wet with ammonia. Dishes used for "developing" carbon prints, and allowed to dry without having been rinsed out with hot water after use, are liable to have a thin layer of gelatine dry upon their surface. This

does not always readily come off, even with hot water; but if a little nitric acid be added to warm water, it will generally be found that the gelatine yields, and may be removed with a nail-brush or coarse rag. Dishes soiled by varnish of nearly every kind can be cleaned by a strong solution of caustic potash, or methylated spirit, or benzole.

181. FILMS, TO REMOVE, FROM UNEXPOSED PLATES.—It sometimes happens that we get plates accidentally light-struck or damaged by damp, etc., and wish to remove the film in order to use the glass; *i.e.*, for lantern cover-glasses. To do this is simple. The following will be found effective:—In a pint jug put a good handful, say a teacupful, of household washing soda (carbonate), and fill up the jug with hot water. By the time the soda is dissolved the hot water will have cooled down to "comfortably warm." The plates are now immersed in this for about five minutes, when running the finger, not along, but across, the edge will start frilling. This is done all round, the film seized at one corner and gently dragged from the plate in one whole piece. The soda bath acts best with undeveloped films. But the hydrochloric acid bath already mentioned answers best with plates developed and dried, especially after pyro development.

182. FILMS FROM OLD NEGATIVES, TO STRIP.—Very often it is required to strip off the film from the glass of a faulty negative, so that the glass may be used for some other purpose. First swelling the gelatine in cold water and removing the film with a hard nail-brush is a common but very unsatisfactory way, because it tears the film into small pieces, and also is apt to leave firmly adhering to the glass small fragments of gelatine. Those methods which enable one to remove the film in one or two large pieces are therefore to be preferred. Dipping the plates in hot water containing some ordinary washing soda, and then a rinse in cold water, will sometimes make the film frill, and so enable it to be removed by gently rubbing. Platinotype workers have, however, always at hand a ready means which scarcely ever fails. When the first acid fixing or clearing bath (containing hydrochloric acid and various salts dissolved from the paper) is exhausted and no longer fit for its first office, it may be most effectively used for the purpose now before us. Place the negative, wet or dry, in this used-up acid bath, film upwards, and then let it remain for say five or ten minutes. On removing the plate, first go all round the margin by rubbing across (not along) the edge of the glass upwards towards the film. This loosens the film along the edges. Now begin in one corner, aiming at the opposite corner, and with the two first fingers rub over and over into a roll the film, which will be found to come away from the glass quite easily. In this way it is quite easy to strip a 12 by 10 negative, keeping the whole film in one piece. Having removed the film, the plate should be now well rinsed in hot water containing a little washing soda.

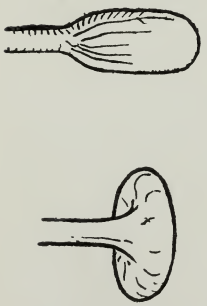
183. GLASS ROD OR TUBE, TO CUT.—Glass rod or tube is usually sold by weight (about 1*s.* to 1*s.* 6*d.* per lb.), and in various lengths (of about 3 feet) and of various sizes, usually from about the thickness of a stout straw to that of one's finger. In making stirring rods or connecting tubes for various experimental purposes, various lengths have to be cut off. This is usually done by making a fine nick by drawing a sharp three-cornered file sharply across the length of the rod or tube. The sketch shows the nick greatly exaggerated for diagrammatic clearness. The rod or tube is now held by the two hands—somewhat in the same way as one holds an oar—the thumbs are placed together at A, *i.e.*, just opposite the file cut, and with a slight bending motion, also a slight pull as though to separate the two hands, the piece comes apart at the crack.



184. GLASS STIRRING ROD, TO MAKE.—A few glass rods of various lengths and thicknesses are very useful in the dark-room—to stir, assist solution, etc.

Glass rod, looking like white porcelain, and known as milk-white rod, or opal rod, is often sold for this purpose, and is more easily seen in the dark-room. Having cut the rod the required size, the ends are softened by heat, when they gradually become fairly round at the ends. (N.B. In all glass-working operations the glass must be slowly heated and slowly cooled, or it will most probably crack.) For this purpose we may use a good-sized spirit lamp, or what is still much better, an ordinary bat's wing or fish-tail gas burner. Gradually bring the end of the rod down towards and then into the yellow part of the flame until it glows red, softens, and all roughness disappears, then slowly remove it and lay aside so that the hot end does not touch any cold substance.

185. A USEFUL FORM OF GLASS ROD.—This is shown in the accompanying sketch. One end of the glass rod is softened in the gas flame, and at the same time some smooth, flat piece of metal is made fairly hot. The glass rod is gently pushed against the warm flat metal, forming a round but flattened end, as shown in the figure. This is very useful for crushing small crystals, and so hastening their solution, or any of the substances which seem to have rather a trick of forming lumps when wet, *e.g.*, borax.



The other end is made quite soft, and is easily nipped with the ends of a pair of flat-nosed pliers. This forms an end something like a drain-cutter's clay spade, and is very useful in dislodging the contents of a bottle that have dried into a solid mass. Alum, soda sulphite, etc., sometimes dry and form a very obstinate mass in this way.

186. FROSTED GLASS, TO IMITATE.—Make a saturated solution of magnesium sulphate (Epsom salts) or sodium sulphate (Glauber salts), or a mixture of the two. To this add a little size, dissolved in a small quantity of hot water, or a strong solution of gum arabic. Apply the mixture, slightly warm, to the glass, previously well cleaned, by means of a wide, soft-hair brush. When dry, the salts form beautiful crystals, resembling the effects of frost. If these fall off, or easily rub off, it is an indication that enough size or gum has not been added.

187. GLASS, VARIOUS KINDS (LENSES, ETC.).—Glass is a substance used in so many ways by the photographer (lenses, plates, bottles, screens, reflectors, etc.), that a slight knowledge of some of the many varieties may interest him. According to Roscoe :—

(1) Crown window plate glass—silicates of soda and lime.
(2) Flint crystal glass—silicates of potassium and lead.
(3) Common green bottle glass—silicates of iron, lime, soda, and aluminium.
(4) Bohemian glass—silicates of potassium and lime.

Lenses are chiefly made from various combinations of (1) crown and (2) flint. The former (crown) is not so refractive as the latter.

The new Jena glasses are another series different in composition and in optical properties of dispersion and refraction from any of the above. Their chief value is due to their having in some cases a small amount of dispersion with a high index of refraction.

188. COLOURED GLASS, TWO CHIEF KINDS, "FLASHED" AND "POT."—(1) Coloured glass is produced in two different ways. (*a*) When the colouring material is introduced into the molten mass, so that the colour is evenly distributed throughout the entire thickness. This is known as "pot" metal. (*b*) Another method is limiting the colour to one side, *i.e.*, fusing a thin layer of coloured glass on to the surface of a colourless sheet. This is known as "flashed" glass. We may roughly compare them to solid wood and veneer.

(2) *Various colours.*

Blue. Cobalt. This, when finely ground, gives the colouring matter smalt and laundry blue.
Violet. Manganese. Artificial amethysts.
Yellow. Uranium. Screens.
Green. Iron-oxide (ferrous). Bottle-green.
Red-brown. Iron-oxide (ferric). Hock-bottle colour.
Green. Copper-oxide (cupric).
Ruby. Copper-oxide (cuprous).
Red. Gold.
Opal. Oxides of tin, zinc, etc.

189. SPIRIT LAMP, TO EXTEMPORISE.—This little convenience in the photographer's dark-room is not so well known as it deserves.

SPIRIT LAMP, TO EXTEMPORISE—*continued.*

Having managed to "get along" without it, the purchase is put off from day to day. Here is a simple and quite effective method of making what will answer quite well under all ordinary circumstances where reasonable care is used. Procure a squat, moderately wide-mouthed bottle (a small pomatum bottle is just the thing); fit to this a fairly sound cork. Take now one, two, or three (as the case requires) pieces of glass tube about 1½ to 2 inches long and about the size of an ordinary cedar pencil. With a cork-borer or round file make holes through the cork, a little distance apart, to receive and fit the glass tubes. The tubes should stand up about three-quarters or an inch above the top surface of the cork. Fit the tubes with a suitable number of strands of lamp cotton. These should not be too few or too tight, but an easy fit. Their ends should project only a quarter of an inch above the top of the glass tube, but may about one-third or half fill the inside of the bottle. Methylated spirit is used in the lamp. Do not fill the lamp quite full, and let the wicks get well saturated before lighting. Be careful that the spirit does not run or ooze on to the outer surface of the cork. To prevent the spirit evaporating, smelling, and wasting, fit to each glass tube another short larger tube as cap, closed at one end. If glass tubing cannot be met with. the metal tube from a common penholder will answer very well. Each end may have an easy-fitting cork cap. In this case it is well to prevent the cork taking fire by protecting its upper surface either with a piece of tin pierced to pass the wick holders, or with two or three layers of the metal foil familiar to lovers of chocolate.

190. CHEAP BACKGROUND, TO MAKE.—Buy 2½ yards of wide, stout brown paper such as is often used for underlaying carpets. This may be had about 5 feet wide. Take of common glue about an ounce; break it up into small pieces, put it in a soup plate and cover with cold water for twelve hours so that it may soften and swell as much as possible. Then melt it by gentle heat in a breakfastcupful of warm water. Stir well, allow any sediment to settle, and skim off any froth. Now take a breakfast cup of whiting; mix with a little cold water, more or less, to make a thin white cream. Then take a teaspoonful of lampblack and rub it (dry) as smooth and fine as possible. Then add enough water to make a thin black-grey creamy mixture. Now add the glue solution to the whiting solution, and add a little more whiting to bring it up to a thin creamy consistency. Add, little by little, enough of the black mixture to the white cream, *thoroughly* mixing them together, until you have a rather light grey mixture. Now with a stiff wide hog-hair brush apply your grey mixture in a *thin* coat all over the brown paper. Do this as quickly and evenly as possible, working the brush in all directions, but not going over the same place twice if it can be avoided. Now hang up in an airy place to dry. This is the first coating. From its condition when dry you will be able to know exactly how to modify the next and final coat. If it dries at all shiny or smooth, too much glue has been used. If it easily rubs or

peels off in flakes, too little glue was used. If too light, add more lampblack, and so on. The colour may be modified by adding ground powder colours procurable at most oil-shops. Good colours to use are light red or yellow ochre for warm greys, and stone blue (ground fine) for cooler greys.

To prepare a graduated ground proceed as before, but prepare two basins of mixture, corresponding to the lightest and darkest tints. Begin with the lightest, and gradually add little by little (in a third cup) more of the dark and less of the light.

The most convenient way to get at one's work is to use a long narrow kitchen table or a couple of planks resting on chairs. It is then easy to keep drawing along the work as the paper is covered.

In laying on a graduated ground avoid anything like a straight line of gradation; work rather in the form of an oval or ellipse and avoid any very sudden jumps from dark to light.

When not in use, keep the paper background *rolled* up, being careful to avoid creases.

191. LEVELLING TABLE, TO ARRANGE.—We often require a perfectly flat and level surface upon which to lay plates coated with gelatine, collodion varnish, etc., etc., so that the film, whatever it may be, may set in a layer of uniform thickness. One of the most practical and at the same time simple arrangements can be simply prepared as follows:—Obtain a sheet of plate glass. For this purpose it need *not* be free from bubbles or scratches. Make of deal, or other wood, three wedges, about three or four inches long, an inch wide, and tapering from a quarter to one inch in depth, *i.e.*, along the slope. If now we place one wedge under the middle of one of the shorter sides of the glass plate, and the other two at the opposite ends of the longer sides, we can in less than a couple of minutes adjust the glass to a level surface by trying it with an ordinary spirit level in all directions. For this latter useful instrument the next best substitute is a glass marble or short piece of stout glass rod. The direction towards which these things tend to roll when we tap the plate gently, shows which of the wedges must be pushed further under the glass so as to raise that side or corner.

192. TO REPLACE A LOST STOP.—To *each* side of a *thin* sheet of card paste a piece of black paper, such as is generally used for wrapping up needles in, and so obtainable almost anywhere. Dry under pressure, *e.g.*, in a book, so that the card keeps quite flat; then with a sharp knife and a suitable sized coin cut out the stop. Failing the black paper, a piece of thin card may be blackened by rubbing it over both sides with the muddy contents of an ordinary inkstand. A piece of ferrotype metal may be employed, but this is not very easy to cut and is apt to give "shiny" edges.

193. LENS CAP, TO EXTEMPORISE.—If lost, a working substitute may be made out of a circular piece of straw board or other stout card and a rim to fit the same—after the manner of a pill-box lid. The rim is fastened to the circular part by means of many short pieces of black tape and glue or gum ; or may be neatly sewn on with black thread. The whole is then covered inside and out with any available black material, *e.g.*, cloth, velvet, etc.

194. BELLOWS OF CAMERA, TO MEND.—When away from home always carry in the pocket of the exposure note-book a piece of black court plaster. A thorny hedge may damage the fingers or the camera bellows, and the court plaster is efficient for either mishap.

195. BELLOWS OF CAMERA—CUTS OFF CORNERS OF PLATE.—This happens when the bellows are not drawn sufficiently forward, *i.e.*, towards the lens. To pull them forward is not always enough ; they must be kept there. For this purpose use a piece of fine flat elastic, long enough to go round a groove about one-third way from lens end. Two side-loops on this can be of such length that they just easily pass over the two screws of the rising front.

196. DRAW-SLIDE OF PLATE-HOLDER, TO EASE.—It is probably within the experience of most readers of these notes that at some time or other the shutter of the dark-slide has stuck, and the consequence is either that the *force* needed to draw it out has shifted the camera so that the picture taken was not quite that arranged on the ground-glass, or that the *time* taken to draw it out has prevented one "getting" a certain moving object satisfactorily. To prevent this, see that the draw-shutter slides easily, smoothly, but not too loosely. To ease the slide perhaps nothing is better than blacklead (plumbago). Take a moderately soft blacklead (cedar) pencil, and thoroughly rub both the *tongue* and *groove* with the blacklead. Failing this, a bit of French chalk (tailor's chalk) or talc may be used. On no account apply oil, grease, soap, vaseline, or anything that can be absorbed by the wood. This will only cause the wood to swell and make matters worse.

197. A GUM PASTE THAT WILL KEEP.—Take a teaspoonful of white starch and an equal quantity of water, rub to a smooth paste in a jam pot ; then pour on it boiling water in a thin stream, stirring vigorously until it goes from a chalk-and-water-like appearance to a clear jelly. Make of common gum arabic a saturated solution and strain through open muslin or fine canvas. Mix equal quantities of the gum solution and starch jelly together : set the jam pot containing the mixture in a saucepan containing water, and boil for five minutes. Set aside to cool and add a few drops of oil of cloves.

198. LIQUID GLUE.—Break up good Scotch glue into small pieces, cover with whisky, and stir night and morning until dissolved ; strain through canvas, and keep corked. This is excellent for thin wood, card, etc., etc.

199. INK.—For writing, etc., on **glass, lantern slides,** etc. Take of copal resin ½ oz. and oil of lavender 4 oz. When dissolved, add the colouring matter, which may be lampblack, vermilion, ochre, in a state of fine division.

200. INK.—For labelling **bottles** (coloured). (1) Take of shellac 1 drm. Dissolve in methylated spirit ½ oz. Dissolve ½ drm. of borax in ½ oz. of water, and add to the shellac in spirit, and add any soluble aniline colour.

(2) **For large bottles, jars, canisters,** etc. Black varnish, to which a little turpentine has been added, may be applied with a small brush, and answers most purposes admirably.

201. PAPER WEIGHTS, TO MAKE.—We are constantly requiring some small, heavy body, *e.g.*, to hold carbon tissue while cutting, to hold a "curly" print down to its mount, to keep a batch of prints flat while drying, etc. If the reader happens to possess any old quarter-plate negatives, let him pack them up in half dozens or dozens, first folding them in a long strip of newspaper, and finally in a covering of thin tough brown paper, making a neat, compact, and handy package with it. Ten years' experience has proved the usefulness of these efficient and not unsightly weights.

202. SORES FROM BICROMATE POISONING.—Some skins seem liable to be attacked by the solutions containing the bichromate salts as used in the carbon and other processes. Sores so produced seem difficult to get rid of. In sensitising or developing this tissue it is advisable, therefore, for those liable to these sores to use rubber tips or gloves. The following recipe is said to be a valuable one for application to sores so produced :—

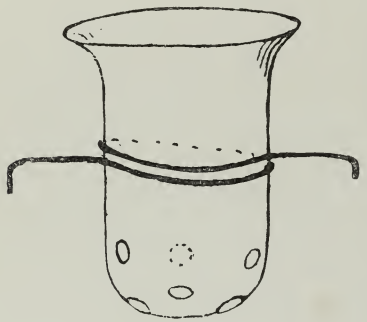
Glycerine	2 oz.
Carbolic acid (pure)	½ ,,
Water	20 ,,

In the case of old sores obstinate in healing they may be painted with a weak solution of silver nitrate (5 grains per oz.). This to be followed by a very slight trace of mercurial ointment.

203. GLASS LAMP CHIMNEY, TO PREVENT CRACKING.—Place the glass chimney in a pan and cover with cold water. Set on the fire until the water boils, and keep it gently boiling for a few minutes, and let the pan and contents cool gradually.

204. CRICKETS, ETC., IN THE DARK-ROOM OR STUDIO.—Collect all the fine tobacco dust from your pouch or jar, or, if not a smoker, buy some cheap, strong, common snuff, and sprinkle the parts patronised by the invaders. Crickets generally "favour" warm places, *i.e.*, where hot-water or stove pipes are laid.

205. A USEFUL APPARATUS FOR QUICKLY DISSOLVING SOLIDS, OR MAKING SATURATED SOLUTIONS.—We sometimes require a solution of some solid substance that does not dissolve very readily, or permit of being easily powdered, *e.g.*, gum, etc., and for certain reasons we do not wish to apply heat to assist solution. The apparatus indicated in the annexed sketch is easy to make, and very useful for the purpose in question. It may very well be made out of the half of a rather wide test-tube (or a small beaker). The end of the test-tube is closed by softening, etc., in the usual manner, forming a curved but nearly flat end. Now take a piece of copper or brass wire, and slightly curve half an inch or so at the end. Direct a small blowpipe flame on the outside of the bottom of the glass tube. When the spot is quite soft, quickly puncture the wall of the tube from within outwards, using for the purpose the curved end of the wire. Holes in various places must be made, but none should be quite at the bottom of the tube. Their size may conveniently be about that of a mustard seed. Now take a piece of stout, soft copper wire, and with a couple of twists form a holder for the tube. The substance to be dissolved (in conveniently small pieces) is now placed at the bottom of the tube. This is then lowered into the dissolving fluid contained in another vessel, *e.g.*, a tumbler, so that its surface is just level with the upper part of the solid to be dissolved. The supporting copper wire rests on the edges of the vessel containing the solvent. The softness of the wire admits of its easy adjustment. If the solvent is volatile, instead of the supporting wire use a piece of stiff, flat card pierced with a hole which *fits* the tube. The tube may be prevented slipping down by an elastic band round it, and just above the card. The solvent finds its way through the holes in the sides, and as soon as it is sufficiently dense flows out at the lower holes, so that a constant circulation is kept up. This plan answers admirably for gums, resins, etc.



206. HYPO, A CONVENIENT METHOD OF DISSOLVING.—A saturated solution of hypo is very convenient, and although its strength varies of course with changes of temperature, yet for fixing purposes this is not of any great importance. Take a piece of fine canvas, and give it two or three washings in boiling water, to which has been added a lump of hypo. Now take a good-sized jug or other convenient vessel, *e.g.*, a large glass jam pot, or a wide-mouthed sweets bottle (obtainable from the confectioner for a few pence). Fold the canvas so as to form

HYPO, A CONVENIENT METHOD OF DISSOLVING—*continued.*

a cone passing into the mouth of the vessel. Fix it in position with string. Fill the canvas cone with hypo. Pour in warm water until it just covers the tip of the cone. As the water dissolves the hypo at the tip, more crystals fall down to take its place. If a suitable jug be chosen, and the right kind of canvas cone formed by a few stitches, it is easy to arrange matters so that the solution may be poured out of the spout without removing the canvas cone.

207. FILTER PAPER, HOW TO FOLD.—Filter papers are generally sold in packets of circular pieces of paper. There are two ways of folding a filter paper for use. Both "the easiest thing in the world" when you know how. First fold the paper in half, so that you have a semi-circle, then again into a quadrant or quarter-circle. Now insert a finger between one of the first folds, and open out as shown in the small fig. 1. You have now a cone, one-half of which has one thickness of paper, the other has three thicknesses. This, of course, will fill your funnel; but as the liquid has to be passed through three thicknesses on one side, it is rather a slow way of working. Secondly, you may quite as easily fold a paper that will act much quicker. Take your circular piece of paper, fold it in half, giving a double thickness of semi-circular shape. Now, beginning at one side, make a fold *about* one-tenth part of the whole semi-circumference, then another about equal in the opposite direction,

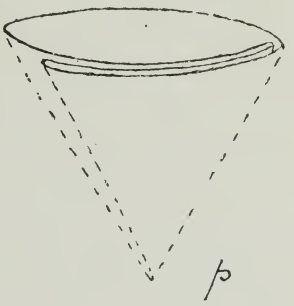


Fig 2

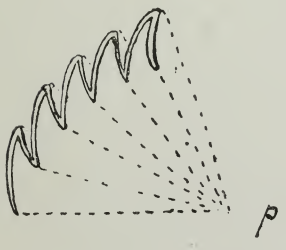
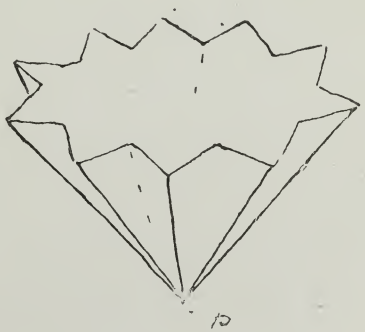


Fig 3



then a third in the same direction as the first, and so on, folding alternately one way and then the opposite. You ultimately have then a fan-shaped arrangement, as shown in fig. 2. If now you open this out, you get a conical paper with many small sloping sides, somewhat as shown in fig. 3. The special point about this method is that you are using all your filter paper only one thickness, consequently you have a greater area at work, and only one thickness for the fluid to pass through; but, curiously enough, this method seems *almost* unknown as compared with the older slower way. The chief thing requiring attention is that, however you fold your paper, some care must be taken not to crack or break, tear, or otherwise injure the paper at part marked *p*. This is very easily done, and, of course, a hole in the filter paper renders the operation useless.

208. THE LENS IN COLD WEATHER.—Before making an exposure, give a glance at the lens to see that moisture has not condensed upon it. This is not unlikely to happen in winter time, when it (the lens) has been kept in a cold place and is brought into a damp atmosphere. Any film of moisture must be removed with a bit of old and very soft silk, quite free from grit, etc.

209. WARM GLOVES FOR COLD HANDS.—Those who suffer from cold hands, and are likely to be occupied with a camera, etc., in the open air in winter time, may be glad to take the following hint:—Have made of soft warm cloth, and flannel lined if preferred, a pair of easy-fitting baby gloves, *i.e.*, gloves whereof the thumb goes into one pocket and all four fingers into another. The point of this suggestion is that one can jump in and out of these gloves at a bound, *i.e.*, taking no more time to put on and take off than it does to put one's hands into one's pockets. This is a great point both in comfort and convenience, especially when the fingers are numb with cold, and one has neither time nor inclination to be bothered by putting on gloves finger by finger. Nor are these "baby" gloves nearly so clumsy as one might suppose. A bit of broad elastic across the inner side of the wrists prevents them coming off when this is not desired.

210. DEVELOPMENT IN COLD WEATHER.—Lowering the temperature generally slows chemical action. Therefore, warm the developing solutions and developing dishes to about 60° Fahr. by placing them in a convenient vessel (big pie dish, etc.) containing warm water. If this cannot be conveniently done, then the developing solutions may be used in a slightly more concentrated form, *i.e.*, less water added.

211. WEATHER SIGNS.—Shall I or shall I not take out the camera to-day? Yesterday was an uncertain half-and-half sort of day, and the barometer has not moved a fraction for hours. Some of the following signs may help in the formation of a "likely" opinion:—

WEATHER SIGNS—*continued.*

Clouds. Thunder packs, cotton bales, or cumuli, appearing during the heat of the day and disappearing towards evening, indicate fine weather. But if they hang about and collect in masses about the horizon you may expect rain. "Mares' tails," or cirri, often mean fine but windy weather. Small black oily or inky-looking patches usually indicate rain.

Rainbow in morning generally foretells more rain; but towards evening one may expect fine weather following.

Corona, or coloured band round the sun or moon, means the weather is changing. If it gets smaller, rain is coming; but if it expands, fine weather may be expected.

Sunset clouds, and colours tending towards green and yellow, generally indicate rain; but if towards red and purple, fine weather may be looked for.

Sunrise. Grey-yellow generally is followed by fine weather, but red sunrise often precedes rain and wind.

Deep blue *sky* favours fine weather; but if turning to grey or milky white-blue, rain is not far off.

Fog in the morning often passes away and brings a fine day, but at night is often closely followed by rain.

Sun dogs, or halo, *i.e.*, a large circle round the sun or moon, mean a change of weather.

Distant sounds distinctly heard generally presage rain or change of wind.

Distant objects seeming clear or appearing nearer than usual generally indicate a downfall of rain.

212. SEASIDE WEATHER SIGNS.—In addition to the notes on weather signs already given, the following may be added as being especially likely to be helpful when away for a holiday at the seaside:—

Clouds soft and delicate generally mean fine weather with light breezes.

Dark, gloomy, blue *sky*, often followed by wind.

High upper *clouds* crossing the sun, moon, or stars in a direction different from that of the lower clouds, indicate a change of wind and possibly rain.

Unusual clearness of *atmosphere* near the horizon (distant ships, hills, etc.) often indicates coming rain.

Twinkling of the *stars*, fragments of *rainbow* patches on the edges of clouds (called wind dogs, wind galls, etc.), often signify wind and rain.

Sea birds flying far out to sea foretell fine weather, but when flying inland or keeping near the shore you may expect wind and stormy weather generally.

213. LIGHT (IN HOMOGENEOUS MEDIA) TRAVELS IN STRAIGHT LINES.—It is upon this fact that the whole fabric of photography rests.

LIGHT TRAVELS IN STRAIGHT LINES—*continued.*

By a homogeneous medium is meant a substance of the same constitution throughout, *e.g.*, pure water, good glass, etc. The atmosphere is denser nearer the earth's surface than it is at the tops of mountains. Hence light does not usually travel in quite straight lines over long distances when passing through the air. But for small distances it is practically homogeneous, and light may be considered as travelling in straight lines.

This law (of "rectilinear propagation") may be roughly shown by a simple experiment, thus :—Take a piece of opaque card, make in it a small hole (with a large pin, etc.). Into a dark room take a candle and the card, arrange a pile of books, etc., round the candle so as to cut off as much light as possible. Then, with the hole of the card held, say, 2 feet from the flame, throw an image of the candle flame on the wall of the room. It will be seen then that the flame, the hole, and the image are always in a straight line.

Practical Application.—(1) Sometimes we have a negative giving dark corners, *i.e.*, the lens does not properly "cover" the plate. How may we find this out before exposure? Set up the camera with lens in position, focus for a distant object in centre of plate. Remove the ground-glass, tilt the camera up towards the sky. Take a piece of card with a small hole (say, $\frac{1}{4}$ inch) in it, hold it just where the *corner* of the ground-glass would come, and look through the hole towards the lens and sky. If you can see a small clear circle of daylight your lens covers the plate.

(2) Again, without using the card, place an eye to the corner where the plate comes, and look through the diaphragm or stop of the lens. If in this position you can see any part of the lens tube or mount, the lens will *not evenly* illuminate the plate, though it may give some kind of image.

(3) In the same way, by moving the rising front up or down, or altering the swing-back, etc., it may be ascertained whether or no the lens is evenly illuminating the plate in all positions.

214. THE LAW OF "INVERSE SQUARES."—This is being constantly referred to in matters photographic, and is of fundamental importance in calculating exposures, enlarging, lantern projection, etc. By the square of a number is meant that number multiplied by itself: thus the square of 3 is 9, of 4 is 16, and so on. The law of inverse squares tells us that the quantity of light falling upon any given area is inversely as the square of the distance of that area from the illuminant.

A simple experiment will make this clear :—Take a sheet of brown paper and cut out a hole 1 foot square. Into any darkened room that has a bare wall take a candle and the brown paper. One yard away from the wall hold up the brown paper and place the candle opposite the middle of the hole 1 yard away from the brown paper, and of course 2 yards from the wall. It will now be observed that the quantity of

light passing through the hole 1 foot square is spread out on the wall over a space 2 feet by 2 feet, or 4 square feet. In other words, the area illuminated at 2 yards is *four* times as large as that illuminated at 1 yard; or, if the same light covers four times the space at 2 yards as it does at 1 yard, it can have only one-fourth the power at 2 yards that it has at 1 yard. Or, again, in other words, if we double the distance we quadruple the area covered and reduce the power one-fourth. Again, if the candle is, say, 2 feet from the brown paper and 6 feet from the wall (*i.e.*, the distance of the wall and the paper are as 3 to 1), we shall see that the space on the wall is now three times each way, or nine times as large as the opening of the paper—that is to say, at three times the distance the light covers nine times the space, and is only one-ninth as powerful. If the distances were as 4 to 1 the light would be only one-sixteenth, at five times only one-twenty-fifth, and so on. Obviously this is of the utmost importance in estimating exposures when enlarging.

Practical Application.—Suppose an enlargement has been satisfactorily exposed 5 seconds with given stop, lens, negative, etc., 30 inches away from the negative, what would be the corresponding exposure 40 inches away? Answer: Increase the 5 seconds in the ratio of 40 squared to 30 squared, or 1,600 to 900, or 16 to 9—*i.e.*, multiply by 16 and divide by 9, *i.e.*, $8\frac{8}{9}$, or say 9 seconds. Again, a quarter-plate, 4 by 3, was enlarged to whole-plate, 8 by 6, with an exposure of 7 seconds; how long should be the exposure under same conditions when enlarging to 12 by 9? Answer: The light which covered the 8 by 6 space, *i.e.*, 48 square inches, now covers the 12 by 9, *i.e.*, 108 square inches. Its intensity is therefore reduced inversely as the space it covers. Consequently the exposure must be increased as the space covered, *i.e.*, 7 must be increased in the ratio of 41 to 108, or 4 to 9; *i.e.*, multiply by 9 and divide by $4 = \frac{6}{4}^3$, say, 16 seconds.

215. A LENS—THE FIVE ERRORS THEREOF.—(1) *Chromatic aberration.* Light passing through a lens, *i.e.*, a curved prism, is decomposed into its various constituent colours. These are not all equally refracted, and do not therefore all come to a focus at the same point, hence chromatic aberration.

(2) *Spherical aberration.* A beam of parallel rays of light falling upon a curved surface must vary as to the angle which they make with the curved surface. And as the degree of refraction, or bending, partly depends upon this angle, it follows that some rays must be refracted more than others. Hence these rays cannot all meet at the same plane. Thus we have this form of error or aberration.

(3) *Aberration of thickness, or distortion.* The rays of light from a straight line, say the edge of a building, passing through a small hole (the stop), will on the first surface of the lens form an approximately straight line. But since the lens is curved, some parts of it will be

thicker along this line than are other parts, and also, since the degree of refraction or displacement partly depends on the thickness of glass traversed, some parts of the straight line will be bent more than are others. Hence distortion. This may be of two forms, the barrel or pincushion, according to the position of the stop relative to the lens.

(4) *Roundness of field.* According to the fundamental law of conjugate foci the image of a straight line in a plane perpendicular to the optic axis is not formed as a straight line, but as a slightly curved line. Its curvature among other things depends upon the refractive index of the glass, its thickness, its curvature, etc. Thus the image of a flat surface is formed as a curved surface.

(5) *Astigmatism.* A lens is directed at right angles to the centre of a vertical plane, say a wall. A black cross is distinctly drawn on a sheet of white card. This is placed on the wall opposite the centre of the lens, the arms of the cross being vertical and horizontal and carefully focussed. Keeping the arms vertical and horizontal, it is now moved so as to come only just within the corner lines of the ground-glass. It will now be found that we cannot get the vertical and horizontal arms in focus at the same time. Each arm can be focussed tolerably distinctly, one at a time, but not both together. The cause of this is not easy to make clear without a diagram; but roughly one may say it is largely a question of the angle of oblique incident rays. The rays coming from the horizontal line fall upon the surface of the lens at a different set of angles to those made by the rays from the vertical line, and hence one set are more sharply defined in one plane, and the other set in another.

Flare spot is not properly a lens defect so much as it is a phenomenon which may or may not happen according to the conditions and surroundings of the lens.

216. LARGE v. SMALL STOPS.—It has often been observed that when two equivalent exposures are made upon the same subject respectively with large and small stops (the times being duly apportioned), the picture made with the large stop is bolder, freer, and more painter-like in breadth and vigour, while that with the small, though having, of course, a much greater depth of sharply defined planes, is flat and weak in comparison with the first-named. The large stop, moreover, seems to yield more gradation in the lower tones, while the small stop, yielding a more sparkling negative, lacks the degree of gradation, and tends to sharper contrasts.

These differences may be in part optical illusions, but the effect has been independently noted by various workers. A large stop gives a better rendering of aërial effect, and effects due to distance, atmosphere, haze.

217. THERMOMETER READINGS, TO TRANSFORM.—Data are sometimes given in Centigrade degrees, sometimes in Fahrenheit degrees. It is convenient to be able to transform the reading from one scale to the other.

(1) *Fahrenheit to Centigrade.* Subtract 32, multiply by 5, divide by 9. *E.g.*, to convert 86 Fahrenheit to Centigrade (*i.e.*, 30° C.): $86 - 32 = 54$; $54 \times 5 = 270$; $270 \div 9 = 30$.

(2) *Centigrade to Fahrenheit.* Multiply by 9, divide by 5, add 32. *E.g.*, to convert 35° Centigrade to Fahrenheit (95° F.): $35 \times 9 = 315$; $315 \div 5 = 63$; $63 + 32 = 95$.

The Centigrade system is sometimes called the scale of Celsius.

218. SIZES OF PHOTOGRAPHIC PLATES, OR CUT GLASS—ENGLISH.

Name.	Inches.	Other Sizes, Quoted by Inches.
One-sixteenth plate ...	$1\frac{3}{8}$ by $1\frac{5}{8}$	$7\frac{1}{4}$ by $4\frac{1}{2}$
One-ninth ,, ...	2 ,, $2\frac{1}{2}$	$7\frac{1}{2}$,, 5
One-sixth ,, ...	$3\frac{1}{4}$,, $2\frac{1}{4}$	8 ,, 5
Quarter ,, ...	$4\frac{1}{4}$,, $3\frac{1}{4}$	9 ,, 7
One-third ,, ...	5 ,, 4	10 ,, 8
Half ,, ...	$6\frac{1}{2}$,, $4\frac{3}{4}$	11 ,, 9
Old half ,, ...	$6\frac{1}{2}$,, $4\frac{1}{4}$	12 ,, 10
Stereo ,, ...	$6\frac{3}{4}$,, $3\frac{1}{4}$	15 ,, 12
Whole ,, ...	$8\frac{1}{2}$,, $6\frac{1}{2}$	18 ,, 16
Extra whole-plate ...	10 ,, 8	20 ,, 16
Lantern ,, ...	$3\frac{1}{4}$,, $3\frac{1}{4}$	22 ,, 18
Panel ,, ...	12 ,, $7\frac{1}{4}$	24 ,, 18
Boudoir ,, ...	8 ,, 5	24 ,, 20
Special cabinet plate ...	$6\frac{1}{2}$,, $4\frac{1}{4}$	26 ,, 22
Double half ,, ...	$9\frac{1}{2}$,, $6\frac{1}{2}$	30 ,, 24
		36 ,, 28

219. SIZES OF FOREIGN PHOTOGRAPHIC PLATES.

Centimètres (Lumière).	Centimètres (Lumière).	Centimètres (Lumière).
6 by 8	9 by 12	21 by 27
6 ,, 9	9 ,, 18	24 ,, 30
$6\frac{1}{2}$,, 9	11 ,, 15	27 ,, 33
$6\frac{1}{2}$,, 10	12 ,, 16	30 ,, 40
8 ,, 8	12 ,, $16\frac{1}{2}$	35 ,, 45
8 ,, 9	13 ,, 18	40 ,, 50
8 ,, 10	12 ,, 20	45 ,, 55
$8\frac{1}{2}$,, $10\frac{1}{2}$	15 ,, 21	50 ,, 60
8 ,, $15\frac{1}{2}$	15 ,, 22	
$8\frac{1}{2}$,, 17	18 ,, 24	

220. SIZES OF PHOTOGRAPHIC PAPERS (SHEETS).

Name.	Inches.
Silver albumenised	23 by 17
Collodion silver emulsion...	24½ ,, 20
Solio (Eastman)	24½ ,, 17
P.O.P. (Ilford)	24½ ,, 17
Matena bromide (Fallowfield), roll	24½ wide
Bromide (Eastman), rolls	10 to 40
Nikko (Eastman)	12 ,, 40
Mezzotype	28 by 20
Gelatino-bromide (Morgan and Kidd), roll ...	17 wide
Alpha (Ilford)	24 by 19
,, rolls	24 wide
Pizzighelli platina, print-out	26 by 19
Jacoby platina	26 ,, 19
Platinotype, sheet	26 ,, 20
,, roll	20 wide
Ferro-prussiate (Fallowfield), roll	29½ ,,
Ferro-gallic (Fallowfield)	29 and 40 wide
Ferro-cyanide ,, ...	,, ,,
Sepiatype, sheet	36 by 30
,, roll	30 wide
Carbon tissue, band	12 ft. by 30 in.
,, ,, half-band	12 ,, ,, 15 ,,
,, ,, quarter-band	6 ,, ,, 15 ,,

221. SIZES OF PAPERS, CARDS, MOUNTING BOARDS, ETC.

Name.	Inches.
Special lithographic...	39 by 38
Antiquarian	53 ,, 31
Double imperial ...	44 ,, 30
Double elephant ...	40 ,, 27
Double Royal ...	40 ,, 25
Super royal	27 ,, 19½
Royal	24 ,, 19½
Leviathan	44 ,, 35
Emperor	68 ,, 48
Colombier	34 ,, 23
Elephant	33 ,, 27

Name.	Inches.
Imperial	31 by 22
Atlas...	34 ,, 26
Demy	20 ,, 15½
Medium	22 ,, 17½
Double foolscap ...	27 ,, 17
Crown	20 ,, 15
Foolscap	17 ,, 13½
Cartoon, rolls, 27, 54, 60 wide.	
Blotting-paper ...	22 by 17
,, ,, ...	24 ,, 19

222. SIZES OF MOUNTS.

ENGLISH.

Name.	Inches.
C.D.V. midget	$1\frac{5}{16}$ by $2\frac{1}{4}$
Victoria ,,	$1\frac{1}{2}$,, $2\frac{3}{8}$
Cabinet ,,	$1\frac{3}{4}$,, $2\frac{1}{16}$
Promenade ,,	$1\frac{7}{8}$,, $3\frac{1}{4}$
Boudoir ,,	$1\frac{15}{16}$,, $3\frac{3}{8}$
Carte, C.D.V.	$2\frac{1}{2}$,, $4\frac{1}{8}$
Salon	$2\frac{5}{8}$,, $4\frac{7}{8}$
Cabinet	$4\frac{1}{4}$,, $6\frac{5}{8}$
Promenade	$3\frac{7}{8}$,, $8\frac{1}{4}$
Panel	$7\frac{1}{2}$,, 13
Boudoir	$5\frac{1}{2}$,, $8\frac{1}{2}$
Imperial	$6\frac{7}{8}$,, 10
Malvern	$3\frac{1}{4}$,, $6\frac{1}{2}$
Salon	$2\frac{5}{8}$,, $4\frac{5}{8}$
Royal	$5\frac{1}{8}$,, $10\frac{5}{8}$
Large Panel	$10\frac{1}{2}$,, 17
Grand Panel	$13\frac{3}{4}$,, 23

AMERICAN.

Name.	Inches
Minette	$1\frac{1}{2}$ by $2\frac{3}{8}$
Petite	$1\frac{5}{8}$,, $3\frac{1}{8}$
Milieu	$1\frac{3}{4}$,, $4\frac{3}{16}$
Quadra	$2\frac{1}{2}$,, $2\frac{1}{2}$
Carre	3 ,, 3
Longa	$2\frac{7}{8}$,, $6\frac{1}{2}$
Card	$2\frac{1}{4}$,, $4\frac{1}{8}$
Victoria	$3\frac{1}{4}$,, 5
Cabinet	$4\frac{1}{4}$,, $6\frac{1}{2}$
Promenade	$4\frac{1}{8}$,, $7\frac{1}{8}$
Panel	4 ,, $8\frac{1}{4}$
Boudoir	$5\frac{1}{4}$,, $8\frac{1}{2}$
Imperial	$6\frac{7}{8}$,, $9\frac{7}{8}$

223. SIZES OF BOOKS, ILLUSTRATIONS, DIAGRAMS.

	Inches.
Super imp. 4to (quarto)	$15\frac{1}{2}$ by 13
Royal ,,	$12\frac{1}{2}$,, 10
Demy ,,	$11\frac{1}{2}$,, $8\frac{1}{2}$
Crown ,,	11 ,, 8
Royal 8vo (octavo)	10 ,, $6\frac{1}{2}$
Medium ,,	$9\frac{1}{2}$,, 6
Demy ,,	9 ,, $5\frac{3}{4}$
Crown ,,	$7\frac{1}{2}$,, 5
Post ,,	$6\frac{3}{4}$,, $4\frac{1}{2}$
Foolscap ,,	7 ,, $4\frac{1}{4}$
Duodecimo (12mo)	7 ,, 4
16mo	$6\frac{1}{2}$,, 4
Royal 24mo	$5\frac{1}{2}$,, $3\frac{1}{4}$

224. SIZES OF PORTRAITS.

	Inches.		Inches.
Head	24 by 20	Half-length	50 by 40
Three-quarter	30 ,, 25	Bishop's half-length	56 ,, 44
Kit Cat	36 ,, 28	Whole-length	94 ,, 58
Small half-length	44 ,, 34	Bishop's whole-length	106 ,, 70

225. SOME USEFUL UNITS.—One often sees formulæ expressed in measures and weights other than those we are more accustomed to use. It is convenient to be able to translate any such formulæ into those measures with which we are the more familiar. The following

SOME USEFUL UNITS—*continued.*

units will be found useful for this purpose. The figures in brackets give a fractional expression sufficiently near the decimal for all ordinary practical purposes:—

1 mètre	= 39·37 inches ($39\frac{2}{5}$)
1 millimètre	= ·03937 inch ($\frac{1}{25}$)
1 kilomètre	= ·621 mile = ($\frac{3}{5}$)
1 yard	= ·914 mètre ($\frac{9}{10}$)
1 inch	= 25·39 millimètres ($25\frac{1}{4}$)
1 mile	= 1·609 kilomètres ($1\frac{3}{5}$)
1 litre	= 1·76 pints ($1\frac{4}{5}$)
1,000 cubic centimètres...	= 35·21 fl. oz. ($35\frac{1}{5}$)
100 ,, ,, ...	= 3 oz. 4 drachms 10 minims
10 ,, ,, ...	= 2 fl. drachms 49 minims
1 cubic centimètre ...	= 17 minims
1 pint	= ·568 litre ($\frac{5}{9}$)
1 oz.	= 28·35 c.c. ($28\frac{2}{5}$)
1 drachm	= 3·55 c.c. ($3\frac{1}{2}$)
1 gramme	= 15·4323 gr. ($15\frac{2}{5}$)
1 kilogram	= 2·2046 lb. avoir. ($2\frac{1}{5}$)
1 oz. avoir.	= 28·35 gr. ($28\frac{2}{5}$)
1 lb. ,, ...	= ·45 kilogram ($\frac{5}{11}$)
1 lb. apoth. or troy ...	= 5,760 gr.
1 oz. ,, ...	= 480 ,,
1 lb. avoir.	= 7,000 ,,
1 oz. ,, ...	= $437\frac{1}{2}$,,
1 pint	= volume or space occupied by $1\frac{1}{4}$ lb. (avoir.) water at 62° Fahr. = 8,750 grains.
1 gallon	= volume or space occupied by 10 lb. (avoir.) water at 62° Fahr.

1 cubic foot of water weighs about 1,000 oz. avoir.

226. APPROXIMATE WEIGHTS OF SOME COINS.—When away from home it is not always possible to borrow scales and small weights (grain, scruple, etc.). With an ordinary letter balance and a couple of empty match-boxes and the following coins, sufficiently accurate weighing for an emergency can be done, for most of the things one is likely to want when developing a few trial plates when away from home:—

Half-crown	= 200 grains	= 14·	grammes (nearly).
Shilling	= 80 ,,	= 5·1	,,
Sixpence	= 40 ,,	= 2·5	,,
3*d.* piece	= 20 ,,	= 1·2	,,
Penny	= 146 ,,	= 9·5	,,
Halfpenny	= 87 ,,	= 3·6	,,

Forty-eight pence = 1 lb. avoirdupois = 7,000 grains.
Threepence = 1 oz. avoirdupois = 437 grains (slightly over).

APPROXIMATE WEIGHTS OF SOME COINS—*continued.*

Two shillings (or one florin) and sixpence = $\frac{1}{2}$ oz. (slightly over).
One halfpenny and one 3*d.* piece = $\frac{1}{4}$ oz. (slightly under).
One shilling and one 3*d.* piece = 100 grains.
A halfpenny is just one inch in diameter.

227. SATURATED SOLUTIONS.—A saturated solution of any substance is made by dissolving as much of the substance as the solvent will take up. In most cases the warmer the solvent the more of the solid substance can be dissolved in it. So that a saturated solution at, say, 80° Fahr.; when cooled down to, say, 60° Fahr., will deposit some of the dissolved substance in solid form at the bottom of the bottle. Hence the best way of preparing saturated solutions generally is to use the solvent warmer than the usual temperature of the solution to be used, and let it cool down. The clear saturated solution is then decanted from the solid precipitated by cooling. It is important, therefore, for those photographers who find it convenient to keep saturated solutions, to know what the strength of the solution is at the usual temperatures. The subjoined table may be of use:—

Table of Saturated Solutions, in water at 60° *Fahr.* (15° *Cent.*)

Boracic acid	... 1 part dissolves in	25	parts water.		
Alum potash (common) ...	,, ,,	10	,,		
,, chrome	,, ,,	12	,,		
Ammonium oxalate	,, ,,	3	,,		
,, bichromate... ...	,, ,,	12	,,		
Borax	,, ,,	15	,,		
Eikonogen	,, ,,	25	,,		
Hydroquinone	,, ,,	20	,,		
Iron protosulphate	,, ,,	2	,,		
Mercury bichloride	,, ,,	18	,,		
Potassium bromide	,, ,,	2	,,		
,, bichromate	,, ,,	8	,,		
,, ferricyanide	,, ,,	$2\frac{1}{2}$	,,		
,, oxalate	,, ,,	3	,,		
Silver nitrate	,, ,,	1	,,		
Sodium acetate	,, ,,	3	,,		
,, hyposulphite	,, ,,	1	,,		
,, sulphite	,, ,,	4	,,		
Iron perchloride...	,, ,,	$\frac{2}{3}$	,,		

228. BOILING POINTS OF SOME LIQUIDS USED IN PHOTOGRAPHY.

Ether	98·6 deg. Fahr.	...	37 deg. Cent.		
Alcohol	174·2	,,	...	79	,,
Benzole	176	,,	...	80	,,
Water	212	,,	...	100	,,
Acetic acid	242·6	,,	...	117	,,
Turpentine	266	,,	...	130	,,
Mercury	667·4	,,	...	353	,,

229. RELATIVE PHOTOGRAPHIC VALUES OF MIDDAY SUNLIGHT.—Every photographer knows that summer midday sunshine is much quicker than spring or autumn, and still more so than winter midday light, but few have any approximately definite idea as to how much. The subjoined table gives a sufficiently accurate idea for all ordinary practical purposes, taking the midday light in July as our unit:—

January	8 to 9	July	1
February	7 „ 8	August	1 to 3
March	5 „ 7	September	3 „ 4
April	4 „ 5	October	5 „ 6
May	2 „ 3	November	6 „ 7
June	2 „ 1	December	8 „ 6

230. INCANDESCENCE.—The relative light-giving powers of zirconium and lime are said to be about 37 to 31. The former is, however, much the more costly.

231. SHARP PICTURES OF MOVING OBJECTS.—*Theoretically*, a sharp picture of a moving object is an ideal impossibility, because, no matter how short the exposure given, the object, if moving at all, must have moved through some distance, and consequently its image cannot have been absolutely stationary during that time.

Practically, however, it is found that an image which has not moved in any part more than one-hundredth of an inch during the exposure, prints out as though it had not moved at all, because the unaided eye does not usually appreciate so small a blur as one-hundredth of an inch.

The *amount of blur* depends upon the rate of movement of the object, duration of exposure, and focal length of lens, the least blur being with a slowly moving object, a brief exposure, and a "short-focus" lens.

The *subjoined tabulations* may be found useful for hand-camera workers.

TABLES showing the movement of an object at various distances corresponding with the one-hundredth inch displacement of the image on the focussing screen:—

(1) With lens $5\frac{1}{2}$ inches from focussing screen.

Distance of Object.			Movement of Object.
1,760 yards = 1 mile	... ...	...	$9\frac{3}{5}$ feet.
880 „ $\frac{1}{2}$ „	... ...	...	$4\frac{4}{5}$ „
440 „ $\frac{1}{4}$ „	... ...	...	$2\frac{2}{5}$ „
220 „ $\frac{1}{8}$ „	... ...	...	$14\frac{2}{5}$ inches.
110 „ $\frac{1}{16}$ „	... ...	...	$7\frac{1}{5}$ „
15 yards 10 inches =	... ...	...	1 inch.

(2) With lens 8 inches from focussing screen.

Distance of Object.			Movement of Object.
1,760 yards = 1 mile	... ...		6 feet $7\frac{1}{5}$ inches.
880 „ $\frac{1}{2}$ „	... ...		3 „ $3\frac{3}{5}$ „
440 „ $\frac{1}{4}$ „	... ...	...	$19\frac{1}{5}$ „
220 „ $\frac{1}{8}$ „	... ...	...	$9\frac{9}{10}$ „
110 „ $\frac{1}{16}$ „	... ...	...	$4\frac{9}{20}$ „
22 yards 8 inches =	... ...	...	1 inch.

SHARP PICTURES OF MOVING OBJECTS—*continued.*

(3) With lens 11 inches from focussing screen.

Distance of Object.						Movement of Object.
1,760 yards	= 1 mile	...	...	...	...	$4\frac{4}{5}$ feet.
880 ,,	$\frac{1}{2}$,,	...	...	...	...	$2\frac{2}{5}$,,
440 ,,	$\frac{1}{4}$,,	...	...	...	...	$14\frac{2}{5}$ inches.
220 ,,	$\frac{1}{8}$,,	...	...	...	...	$7\frac{1}{5}$,,
110 ,,	$\frac{1}{16}$,,	...	...	...	...	$3\frac{3}{5}$,,
30 yards	20 inches =	...	..	...	...	1 inch.

For example, suppose a horse travelling at a rate of 10 miles per hour —*i.e.* about $14\frac{1}{2}$ feet per second—is to be photographed with a $5\frac{1}{2}$ inch lens with one second exposure. If it be anything more than 220 yards away from the camera, the blur will not exceed one-hundredth of an inch, *i.e.*, the print will be sharp enough for most purposes. But if an 8 inch lens is being used, the object ought to be *nearly* 440 yards away (*i.e.*, this distance would permit a movement of $19\frac{4}{5}$ inches), while if we use an 11 inch lens, the object should be $\frac{1}{4}$ mile or more away.

232. SOME USEFUL ADDRESSES.—Permission to take Photographs. It does not seem to be generally known that it is necessary to be armed with a formal permission in order to use one's camera without fear of interruption or prevention by the custodians of our various parks, public gardens, etc., etc., in and near London. The necessary permissions are usually granted at once if applied for in the proper way. Write briefly and very clearly, give name in full, address, occupation. Enclose stamped and addressed envelope for the reply. State clearly that you wish for permission to take "views," or sky studies, clouds, trees, etc., as the case may be (portraiture is not permitted, and the permissions do not apply to Sundays; as a rule the length of the permission varies, but its conditions, time of expiration, etc., are stated). Acknowledge briefly and promptly the receipt of the permission by a few words of thanks. This will facilitate its renewal if needed.

For Hyde Park, St. James's Park, Green Park, Greenwich Park, Richmond Park, Bushey Park, Regent's Park, Primrose Hill, Kensington Gardens, Hampton Court Palace and Gardens—Reginald B. Brett, Esq., H.M. Board of Works, Whitehall, S.W.

For Victoria Park, Battersea Park, Dulwich Park, Kennington Park, Finsbury Park, Clapham Common, Wandsworth Common, Embankment Gardens, Blackheath, Hampstead Heath, Bostall Heath, etc., and other places under the control of the London County Council—H. De la Hooke, Esq., Clerk to L.C.C., Spring Gardens, S.W.

For Epping Forest, Highgate Woods, Wanstead Park—Sir John Monckton, Town Clerk's Office, Guildhall, E.C.

For Kew Gardens—The Director, Royal Gardens, Kew.

For City Buildings—John Whalley, Esq., 26, Old Jewry, E.C.

For Bunhill Fields Cemetery, top of Monument, etc.—The Secretary, Lands Committee, Guildhall, E.C.

For Windsor Park, Virginia Water—Capt. W. Campbell, Holly Grove, Windsor Park, Windsor.

SOME USEFUL ADDRESSES—*continued.*

For Zoological Gardens—The Secretary, 3, Hanover Square, W.

For Botanical Gardens—The Secretary, Botanical Gardens, Regent's Park.

For St. Paul's Cathedral, Westminster Abbey—The Dean, etc.

For British Museum—The Director, etc.

For National Gallery—The Director, etc.

For South Kensington Museum—The Director, etc.

For various provincial Cathedrals—The Rev. the Dean, etc.

For Colleges of Cambridge and Oxford—To the Master, President, Provost, Warden, or Principal, as the case may be (see the various University Calendars).

233. PATENTING AN INVENTION.—The following brief and incomplete jottings may be of some slight service to the more ambitious inventive amateur. A provisional specification has to be made on a form with a £1 stamp. The complete specification on another form with a £3 stamp. The first describes the nature of the invention. The latter particularly describes the invention, the manner in which it is performed, etc., and gives a distinct statement as to the novelty or invention claimed. The Patent Office makes no search as to novelty and guarantees nothing, so that the acceptance of the fee is no proof or guarantee of the validity of the novelty or invention. The records in the Patent Office are open for examination without fee. Priority of invention counts from the date of application. Provisional protection entitles to the use and publication of the invention, but does not protect against infringement. Specifications may be obtained through any Post Office. Detailed instructions should be obtained from the officials of the Patent Office, Southampton Buildings, Chancery Lane. (Library at same address.)

234. COPYRIGHT. HOW TO REGISTER A PHOTOGRAPH.—Write to *The Registrar, Copyright Office, Stationers' Hall, Ludgate Hill, E.C.*, enclosing postal order for one shilling, and also a good-sized stamped and addressed envelope, asking for a dozen copyright forms for photographs. On each form the needed instructions are given. They may be briefly put thus: Fee for each work is one shilling. A form has to be filled up and copy of photograph sent with it. Postage stamps not received in payment of fee. Certified copy of the registration or entry on payment of five shillings. No action can be maintained or penalty recovered for anything done before registration.

235. COPYRIGHT UNION.—This society exists for the purpose among other things of placing photographic copyright upon a satisfactory basis, and gives attention to the interests of those possessing such copyrights. The reader may obtain further information from the Secretary, Mr. Henry Gower, Copyright Union, Photo Section, London Chamber of Commerce, Botolph House, Eastcheap, E.C.

236. AN IMPROMPTU DUSTING BRUSH.—Should the ordinary wide soft-hair brush used for dusting the film surface be mislaid or lost when on tour, a very fair substitute may be made as follows:—Take a sheet of stiff notepaper and fold it into four; do *not* press down one edge into a sharp crease, but leave it slightly curved. Cover the curved edge with a piece of soft velvet ribbon, and use this lightly as a dusting brush.

237. COPYING A SILVER PRINT.—Very frequently the albumen surface is so much cracked that when sharply focussed these cracks show as a fine network all over the negative. The print should be stripped from its mount by soaking in tepid water.

A clean glass, free from scratches or bubbles, etc., is put into a dish of quite clean water, the print transferred to the same vessel, and brought face in contact with the glass, and the two removed together. All adherent moisture is removed, and the copy made through the glass; care being taken, of course, to avoid reflections.

If the print is yellow with age, stains, etc., it is an advantage to use a piece of pale blue glass behind the lens, *i.e.*, inside the camera. This should be thin, and with parallel sides if possible. Failing this, a glass trough containing ammonia-sulphate of copper solution may be used.

238. COPPER CELL FOR PHOTO-MICROGRAPHY.—This is used to filter the light so that the optical and visual focus may more or less coincide. An extempore cell may be made by cementing two circular thin covers to a vulcanite ring. Part of the ring is cut off so that the cell may be filled with the fluid, and the removed part is then replaced and cemented up.

The fluid may be made by dissolving ordinary copper sulphate (blue vitriol), then adding drop by drop liquid ammonia until the precipitate formed dissolves on shaking.

The solution is then carefully filtered and introduced into the cell by means of a pipette, and the cell closed at once.

239. DEVELOPING INTERIORS.—First soak the plate in pyro with half or less than half normal quantity of bromide. Then add the alkali a little at a time. The quantity of pyro should be considerably reduced if the subject shows strong contrasts, *e.g.*, a church with light walls and dark roof.

240. TO LABEL TIN CANISTERS.—Many useful things for dark-room use may be conveniently kept in tins (cocoa, mustard, etc., etc.), but they should be distinctly labelled. This may be done with black varnish and a small brush. Or the label may be of paper. To make this adhere, prepare a solution of shellac in spirit, say a teaspoonful of shellac and an ounce or so of methylated spirit. Brush this on the tin and wait a few moments until some of the spirit has evaporated and the surface is sticky. Then press on the paper and touch again with the varnish just round the edges.

241. CARBON PRINTING—THE SAFE EDGE.—For this purpose you may employ (1) black varnish, but this is not so convenient as (2) orange or, still better, black "needle" paper (also sold for cutting out lantern-slide mats), or (3) the usual black (gummed) paper strips used for binding lantern slides. But in any case it is as well to put the safe edge on the glass side. Not only is it then possible to be removed or corrected in position without injuring the film surface, but it seems also to do its safe-edge work better when slightly separated from, *i.e.* not in, actual contact with the carbon tissue.

242. PLATINUM PAPER, TO KEEP DRY.—The most important point in the storage of platinotype paper is keeping it dry. The calcium chloride should be dried at frequent intervals. It is not enough that it *feels* dry. This may seem to be the case, but if a little heat be applied it will probably show signs of moisture. To dry the calcium chloride the simplest way is to turn it out of the surrounding cotton wool or other wrappings, place the pieces on an ordinary shovel, and hold over the kitchen fire until it first gets wet and then goes white, hard, and dry. Return it while still warm to its wrappings and then to the tube. If a fire be not available, a sheet of tin, *e.g.* an old biscuit-box lid supported on a couple of bricks, and a spirit, or gas, or paraffin lamp underneath will meet the case. Of course, the wrappings must also be dried. This is best done by placing them in a soup plate and putting them in an oven, not too hot, lest they get scorched. The same calcium chloride may be used again and again if it be thoroughly dried from time to time.

243. ESTIMATING EXPOSURE.—After taking into consideration the speed of the plate, lens aperture, month, hour, and light, do not forget to look at the *nearest dark* (slow-coloured) object or *deep shadow*. Its distance and its colour are of first importance. Due consideration of this factor will often save what would otherwise be an utter failure from under-exposure.

244. PHOSPHORESCENCE.—When the colours or luminescence induced by the phenomenon known as fluorescence *continue* to be visible for an appreciable time after the stimulating influence is removed, the phenomenon is then designated phosphorescence. Of such kind are the various "luminous paints." Advantage has been taken of this phenomenon in certain instruments for estimating the relative sensitiveness of photographic plates, etc.

245. FLUORESCENCE.—When the short and frequent ultra-violet waves of the spectrum fall upon certain substances they become luminous and glow with colours different from those (if any) which they exhibited under ordinary conditions of white light, *i.e.*, the short and rapid waves are lengthened and "slowed," and brought into the region of the ordinary visible waves. Such are the fluorescent screens used in X-ray observations.

246. CALORESCENCE.—Invisible heat rays can be reflected and brought to a focus in the same way that visible light rays are condensed. If a suitable substance be placed at the focus of the heat rays the long heat waves are shortened and quickened into visible waves, and the body becomes luminous. This phenomenon is termed *calorescence.*

(Compare this with fluorescence.)

247. INCANDESCENCE.—Chemical combustion may take place and yet yield little or no heat. For instance, a hydrogen flame gives little light but great heat. When such heat acts upon many refractory substances, *e.g.*, metals, earths, etc., they become heated and glow. When they pass from a dull red to a brighter, whiter glowing condition, they are said to be in a state of *incandescence.* The light of a candle, lamp, gas flame is due to the heated and glowing particles of carbon.

The light from the various incandescent mantles is due to their being heated. If a thread of asbestos be held above the hot but dark part of a Bunsen burner it will become incandescent.

248. RADIATION.—When energy (*e.g.*, heat, etc.) is given off from a body or source, and is transmitted by or through the surrounding air or ether in all directions, it is spoken of as radiant energy, *i.e.*, it is supposed to travel in ray-like or radius-like paths.

249. IRRADIATION.—A term (derived from *radius* = a ray) applied to that phenomenon by virtue of which white or brightly coloured objects appear somewhat larger than they really are. Thus if a platinum wire be caused to glow by passing through it an electric current, the wire appears very considerably thicker when glowing than when cold. Again, the narrow crescent of the new moon seems to embrace the other, *i.e.* non-illuminated, part of the moon. Hence the old saying, "The old moon lies in the lap of the new one." Star images often appear much larger than they are, etc. Similarly a black and a white thread of equal diameter—the former against a light background and the latter against a dark background—show the same apparent difference, *i.e.*, the white thread seems the wider. Hence a lady's waist looks smaller with a black than a white dress. Black shoes seem smaller than white ones of the same size. The reason of the phenomenon is probably due partly to the spherical aberration of the eye and partly to the spreading of retinal stimulation.

250. IRIDESCENCE.—A term derived from *iris*, the rainbow, and applied to objects or surfaces showing various colours, *i.e.*, rainbow-like. Photographers are familiar with the iridescent stains along the edges of the films of some plates. These are more liable to occur with plates kept for any length of time, or in an impure atmosphere, and are especially liable to follow development with pyro ammonia. The phenomenon is due to what opticians term "interference," "colour of thin plates," "Newton's rings," etc. Coal tar on water, many shells, feathers, soap bubbles, cracks in ice, glass, etc., also show the phenomenon.

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